DOCUMENT RESUME

ED 322 354 CE 055 476

TITLE Non-Renewable Resources Curriculum.
INSTITUTION Alaska State Dept. of Education, Juneau. Div. of Adult and Vocational Education.
PUB DATE 88
NOTE 80p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Citizenship; Competency Based Education; Curriculum Development; Educational Objectives; Employment Qualifications; *Entry Workers; *Fuels; Leadership; *Mining; *Natural Resources; *Occupational Information; Postsecondary Education; Secondary Education; *State Curriculum Guides; Vocational Education
IDENTIFIERS *Alaska

ABSTRACT

This document is designed to help teachers and administrators in Alaska develop secondary and postsecondary training in nonrenewable natural resources. Its competencies reflect those needed for entry-level employment in the following industries as identified by international businesses surveyed in Alaska: gas and petroleum, coal, placer, and underground mining. Section 1 introduces the concept of competency-based curriculum and the role of vocational educators in curriculum planning, implementation, and evaluation. Section 2 describes the scope and sequence of nonrenewable natural resource competencies. Section 3 presents basic and advanced competencies and accompanying tasks in leadership and citizenship, introduction to nonrenewable natural resources, gas and petroleum, and mining. Section 4 contains four course descriptions that provide a framework for the design and implementation of a balanced program in nonrenewable natural resources. Section 5 provides curriculum analysis matrices. Section 6 contains a sample skills card. Section 7 lists 19 pages of information on sources of instructional materials and supplies for nonrenewable natural resources education. (CML)

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Non-Renewable Natural Resources

Curriculum

Secondary and Postsecondary Articulated Curriculum

State of Alaska
Steve Cowper, Governor

Developed by the:
Alaska Department of Education
Office of Adult and Vocational Education

William G. Demmert, Commissioner

Karen Ryals, Administrator,
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This publication was prepared with the support of U.S. Department of Education funds under the Carl Perkins Vocational Education Act, PL98-524. Copies are available from the Alaska Department of Education, Office of Adult and Vocational Education, Alaska Vocational Materials Library, Box F, Juneau, Alaska 99811, (907)465-2980. This publication may be duplicated.

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Foreword

This competency-based curriculum is designed to be a handbook for non-renewable natural resources in Alaska. It includes competencies a student will acquire in non-renewable natural resources training. Such courses cover the following areas: Gas and Petroleum, Coal, Placer, and Underground Mining.

Development of this handbook began with a survey of Alaskan non-renewable natural resources employers. Their priorities regarding the skills and knowledge students need to acquire to survive and thrive in the industry form the basis of this handbook. For example, industry's emphasis on the importance of communication and personal skills is reflected in the Employability Skills area of the Leadership/Citizenship unit.

This handbook stresses the importance of understanding the forces affecting Alaska's non-renewable natural resources. Most units begin with definition of terms and principles so that students will have conceptual frameworks for adding the details of various techniques.

The two areas of concentration, while not intending to be comprehensive and inclusive of all employment in non-renewable natural resources in Alaska, concentrates on major employment areas. The competencies and tasks are presented so that instructors have the prerogative to determine which aspects they want to teach in either overview course(s) or in specialty courses. Non-Renewable Natural Resources areas were organized along the following lines: I. Work With the Resource; II. Use the Resource: III. Manage and Protect the Resource; IV. Define the Resource; V. Understand the Importance of the Resource; and VI. Understand Competing Uses. This organization enables students to obtain hands-on experience and theoretical knowledge.

The handbook is organized into seven sections:

Section I introduces the concept of competency-based curriculum. The role of vocational educators in curriculum planning, implementation, and evaluation is also included.

Section II provides the scope and sequence of non-renewable natural resource competencies.

Section III presents the curriculum including the competencies and tasks for non-renewable natural resources instruction.

Section IV contains course descriptions to assist school districts in developing their vocational programs.

Section V provides curriculum analysis matrices to be used to determine competencies to be included in specific non-renewable natural resources courses.

Section VI contains a sample skills card for evaluating and recording student progress.

Section VII lists information on resources and specific materials available in Alaska and the rest of the nation.

It is recommended that all students participate in career awareness and exploration experiences to help them understand the connection between school, work and career plans.

Acknowledgments

This handbook reflects the competencies for entry-level employment in targeted non-renewable natural resources industries. It reflects input from numerous Alaskan natural resource professionals. Thanks and recognition go to the following technical committee companies, corporations, offices, and associations for their assistance and cooperation:

Alaska Guide Board
Alaska Loggers Association
Alaska Miners Association
Alaska Seafood Marketing Institute
Alaska Trollers Association
Alaska Women in Timber
Bristol Bay Native Corp.
Chugach State Park
Cominco Alaska
Cooperative Extension Service
Denali National Park
Engstrom Dredging
Far North Tree and Seed Company
Interior Wood Cutters Association
Lindh Associates
MDD, Developer
Nana Corporation
Pakka Associates
R & M Consultants, Inc.
Resource Development Council
Sealaska Corporation
Society of American Foresters
Tesoro Alaska
The Wilderness Society
U.S. Bureau of Mines
U.S. Forest Service
U.S. National Park Service
United Fishermen of Alaska
Usibelli Coal Mining, Inc.
Usibelli Coal—Marketing Division
West High School

Thanks also go to the following technical committee members who assisted in the development of this curriculum:

Senator DickEliason, Sitka
J.R. Gildersleeve, Ketchikan
Karl Hanneman, Fairbanks
Toni Hinderman, Anchorage
Phil Holdsworth, Juneau
Steve Jacoby, Juneau
John Mulligan, Douglas
John Williams, Kenai
Senator Fred Zharoff, Kodiak

A task force of Alaskan educators in non-renewable natural resources education helped to define the units, competencies, and tasks. The task force, which met to finalize this handbook, deserves a great deal of credit for their hard work and valuable input.

John Blackwell, Alaska Mineral and Energy Resource Education Fund (AMEREF)
Robert Boyle, Bering Strait Schools
Jeff Burton, Applied Mining Technology Program, Tanana Valley College
Al Clough, Bureau of Mines
Judith Entwife, Minerals & Energy Resource Education Fund, Juneau
Wayne Erickson, Institute of Mining Technology, University of Alaska Southeast
Scott Eubanks, Institute of Mining Technology, University of Alaska Southeast
Bob Greg, Institute of Mining Technology, University of Alaska Southeast
Jim Jacobs, ARCO, Alaska, Inc.
Debbie Kendrick, Mining and Petroleum Training Service, Soldotna
Curt McVee, Alaska Miner's Association
Joel MoLyneux, Kotzebue Technical Center
Dennis Steffy, Mining and Petroleum Training Service, Soldotna
Bob Strother, Mining and Petroleum Training Service, Anchorage

Thanks also go to other non-renewable natural resource educators who reviewed the curriculum and provided valuable suggestions:

Paul Bowen, Petersburg High School
John Babcock, Echo Bay Exploration Inc.
Leo Mark Anthony, University of Alaska, Fairbanks
Tom Tunley, Anchorage West High School

Special appreciation is expressed to Richard Steele who directed the compilation of this handbook, Carin Smolin who prepared the final copy, and Mark Hanson, Associate Director of the South East Regional Resource Center, who administered this project.

Special thanks are also due South East Regional Resource Center employees Ginger Murar and Dave Wood who designed the graphics for the handbook.

Finally, Verdell Jackson, Curriculum Specialist for the Office of Adult and Vocational Education, must be recognized for designing the curriculum development process and for participating in every step of the handbook's development ensuring that it is a model Alaskan curriculum of the highest quality.

Karen Ryals, Administrator
Office of Adult and Vocational Education
Alaska Department of Education
October 1988

I

Introduction to Competency-Based Curriculum

Competency-Based Curriculum

Vocational education should be directed toward the skills, knowledge, and attitudes needed for successful employment. Changes in technology are affecting the job requirements in non-renewable natural resources. Such changes require educators to update their curriculum in order to prepare students for competition in the job market.

An effective method for delivering vocational education is through a competency-based curriculum. This curriculum is based on a task analysis of the key occupations in non-renewable natural resources. Once a competency-based curriculum is set in place, student performance must be measured on levels of proficiency in those competencies. Thus, the critical features of competency-based education are:

1. validating competencies to be included in the curriculum; and
2. evaluation of student competency levels.

This curriculum handbook sets direction for local curriculum developers. It provides a framework for developing courses of study and lesson plans in local high schools and vocational institutes.

Curriculum Based On Competencies

Competence refers to the adequate performance of a task. The task may be evaluated according to the performance or process, the product, or both.

Competency-Based Vocational Education consists of programs that derive their content from the tasks performed in each occupation/job and assess student performance on the basis of preset performance standards.

Learning materials define the competencies the student is to master, the criteria by which the student will be evaluated, and the conditions under which the evaluation will occur.

Competency-based instruction places emphasis on the ability to do, as well as on learning how and why. Student performance and knowledge are individually evaluated against the stated criteria, rather than against group norms.

The competency process utilizes a checklist of attitudes, knowledge, and skills that are commonly needed by entry-level employees in non-renewable natural resource occupations. In developing this curriculum handbook, a cross-section of natural resource professionals were asked to respond to the checklist on the basis of needs within their own establishments. The checklists were tallied and summarized to determine which attitudes, knowledge, and skills were common to firms in Alaska.

Student Performance Assessment

A curriculum becomes competency-based when students are assessed on the basis of their competence. Sample skill cards are provided in this guide for teachers who wish to use them in assessing the competency levels of their students. The card has four levels of proficiency which allow continued development of skills. The card can be used to monitor students' progress as they move between non-renewable natural resource classes, between teachers and grade levels and between school and work. The completed skills card is an important part of a placement portfolio when students begin their job searches.

Curriculum Delivery Systems

Vocational Student Leadership Organizations

Some of the competencies in this curriculum guide cannot be fully met in traditional classroom and lab settings. The Vocational Industrial Clubs of America (VICA) is a delivery system which can be integrated into the regular school program. Human relations skills as well as job skills will be enhanced by student participation in VICA. VICA activities should complement instruction in the non-renewable natural resource classroom and lab. They should be integrated as a curriculum delivery system and not allowed to become an extracurricular activity. VICA is the organization for all non-renewable natural resources students. VICA is for students interested in gas and petroleum and/or mining.

Cooperative Work Experience

Some of the competencies identified in this guide cannot be fully developed at a school site. A work station in the community offers realistic experiences in fulfilling the program goals in career development and human relations. Cooperative Work Experience offers an excellent vehicle for the delivery of instruction. With well developed training plans, teachers and employers can cooperate to prepare students for employment. Cooperative Work Experience extends the instructional program beyond the availability of equipment and instructor time at the local school. Teachers and employers must maintain regular communications to assure that students are receiving a high quality experience.

The Rural Student Vocational Program (RSVP) provides a two week full-time work experience for students from rural areas where job stations are limited or non-existent.

The Job Training Partnership Act (JTPA) provides on-the-job experience to disadvantaged youth in both urban and rural areas.

Role of Instructor in Curriculum Planning, Implementation, and Evaluation

The vocational instructor fulfills many roles which include the following responsibilities:

- Prepares a written vocational program plan.
- Develops and maintains a written program philosophy with objectives that support the philosophy.
- Maintains a written list of competencies identified as needed for the program area.
- Devises and maintains a classroom management system for implementing the curriculum materials provided for the program area.
- Evaluates the curriculum content periodically to determine curriculum changes and updates. This includes the involvement of the students (present and former), advisory committee members, and other personnel.
- Selects units of instruction and plans lesson plans based on the competencies of the occupation.
- Provides appropriate instructional materials, supplies, and equipment for the students to use.
- Provides school guidance counselor with information and updates regarding implementation of the specific curriculum.

- Works to actively recruit, retain and maximize success of non-traditional students (those students who; by virtue of their grades or gender, have traditionally been excluded from this content area).
- Reviews the instructional materials to assure that they are free from sex bias and sex role stereotyping.
- Works with an advisory committee.
- Assists and/or serves as an advisor to the appropriate student organization (VICA) related to the vocational program area.
- Plans and arranges an appropriate classroom learning environment. This involves assisting students of different abilities to work at their own pace and in cases where remedial instruction is needed, securing additional help for those students.
- Reinforces basic skills of reading, communication (written & oral), and computation through vocational education experiences.
- Helps determine what objective(s) should be established for students with special needs as a part of the Individual Educational Plan (IEP) development.
- Uses a grading procedure that is made available and appropriate to all students at the beginning of their program.
- Sets an example for grooming and dress that is generally found in the occupational area in business or industry to enable students to establish appropriate standards.

Benefits of Competency-Based Curriculum

Competency-based vocational education offers several benefits to students:

1. The competencies/tasks are directed to the student and provide measurable criteria for determining when the student has acquired the necessary knowledge and skills.
2. Students receive realistic training for the job. They become competent in tasks that are relevant to the occupation.
3. Students know what is expected of them throughout the course. The competencies are made available to them at the onset. They know what they will be doing and how well it must be done.
4. Each student is individually responsible for completing each competency attempted in the curriculum.
5. The basic thrust of the competency-based program is to evaluate students according to their accomplishment of tasks as they work up to individual capability.Students are not compared with other students in their accomplishments because each is expected to work according to employment standards. Because of the various evaluation policies of different school systems, the ideal of not comparing students in determining grades is not always possible.

II
Program Development

Program Development

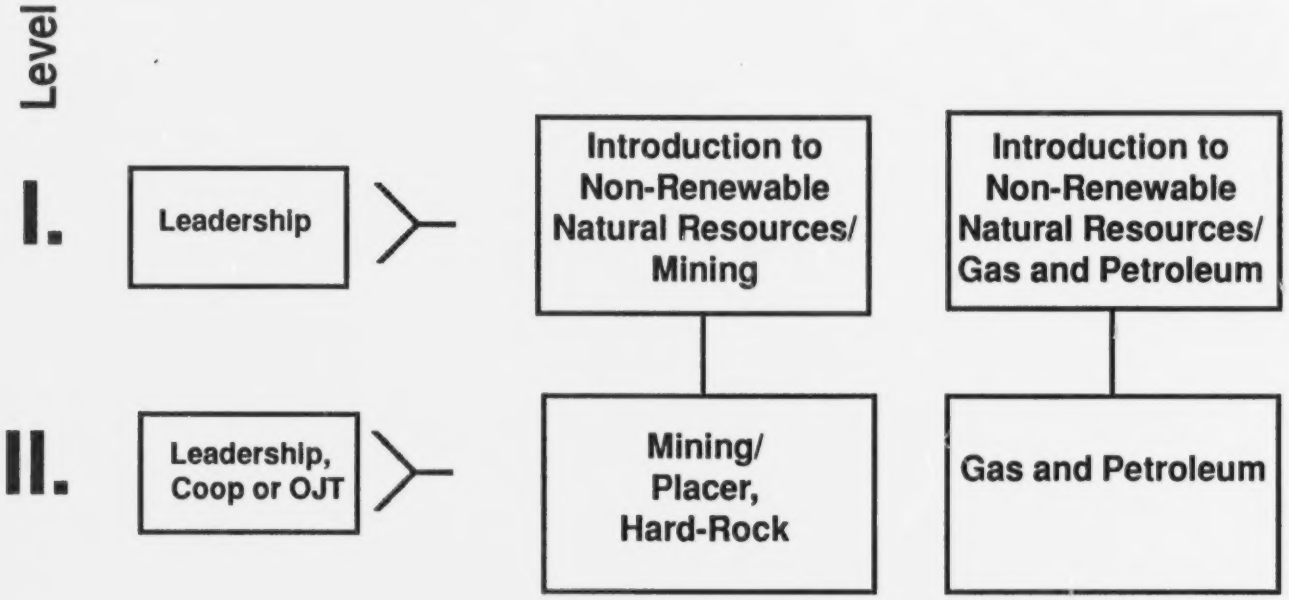
The format of this handbook was selected to aid administrators and teachers in concentrating on the skills needed for vocational training. It will assist in selecting the array of units and the delivery system which fit the school. This provides the flexibility of varying the course content to include the most valuable skills as appropriate for the scope and sequence. The primary importance is that students are able to secure foundation skills. Schools can vary their delivery systems to maximize student opportunities by:

1. Offering courses on alternate years or other planned sequences
2. Offering two or more courses in the same class
3. Providing individualized materials and instruction

Matrices are included in this guide for use in planning the courses to be offered and the content of each course.

The following chart shows a hierarchy of the non-renewable natural resources competencies that are emphasized for this curriculum.

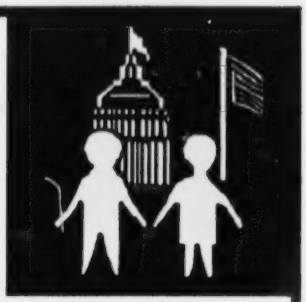
Hierarchy of Competencies for Non-Renewable Natural Resources



Note: Leadership/Citizenship belong in both levels. Cooperative Vocational Education (Coop) and On-the-Job-Training (OJT) belong in the second level.

III
Competencies and Tasks

Leadership/Citizenship



Competency: **Use leadership skills**

Tasks:

Describe the Vocational Industrial Clubs of America (VICA) and how it promotes leadership skills:

a. Participate in meetings according to rules of parliamentary procedure
b. Function effectively on committees by accepting assigned responsibilities
c. Plan and conduct effective group leadership activities
d. Participate in society in a democratic way
e. Be punctual and dependable
f. Follow rules, standards and policies
g. Work cooperatively with others

Work in committees
Define self-esteem and explain its importance
Practice eye contact
Use a firm handshake
Use presentation skills
Use social skills
Use communications skills
Participate in leadership activities

Competency: **Demonstrate initiative and productivity**

Tasks:

Organize time effectively
Be responsible
Care about the quality of work

Competency: **Attain work maturity**

Tasks:

Describe the importance of openness to new situations
Demonstrate characteristics of the mature person:

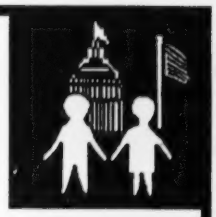
a. self-acceptance
b. consideration and respect for others
c. self-control
d. positive thinking and attitudes
e. flexibility
f. initiative

Maintain good work relationships
Differentiate between personal and job-related problems
Follow orderly and systematic work behavior

Competency: **Be honest**

Tasks:

Define honesty and integrity
Explain how to deal with theft and dishonesty
Relate employee integrity to overall company performance



Competency: **Be reliable and dependable**

Tasks:
Maintain acceptable attendance records
Be on time
Give timely notice of interruptions to work schedule
Follow rules of work site or training site
Follow directions

Competency: **Solve problems**

Tasks:
Explain the importance of having a method for analyzing and solving value problems
Use the problem-solving process:
a. identify problems
b. obtain information
c. analyze problems
d. develop and analyze alternative solutions
e. choose a course of action
f. persevere through hardships
g. recognize and change otherwise unworkable solutions
h. repeat process as necessary to refine solutions

Competency: **Be assertive**

Tasks:
Differentiate between assertive, aggressive, and passive behavior
Discuss whom to go to for employee problems

Competency: **Maintain good personal relations**

Tasks:
Use positive attitudes with others
Accept supervision and criticism
Cooperate with others
Accept the chain of command

Competency: **Follow oral and written directions**

Tasks:
Ask for clarification
Use listening skills
Review situations of poor communications
Read directions when assembling and repairing equipment

Competency: **Deal effectively with clients**

Tasks:
Greet the client
Talk politely to client
Obtain all necessary information from client in writing
Identify the business on the telephone
Relay client complaints to employer

Competency: **Evaluate personal traits in relationship to self-employment**

Tasks:
Explain terms and principles associated with entrepreneurship
Describe the role of self-employment in the free enterprise system
Identify types of business organizations including:
a. sole proprietorship
b. limited partnership
c. partnership

Identify personal traits necessary for self-employment
Identify risks and rewards of starting a new business
Identify the role small businesses have played in job creation and new products and services
Identify the steps for establishing a business
Explain the importance of developing a business plan
Locate information and assistance on starting a small business

Employability Skills

Competency: **Work safely**

Tasks:
Inspect equipment and facilities for safety and health hazards
Follow safe work habits
Wear appropriate protective clothing
Use proper lifting and carrying methods
Identify personal hygiene and sanitation practices
Interpret information on labels and signs
Maintain and adjust safety shields and devices
Identify consequences of not following safety precautions
Follow safety precautions when using equipment

Competency: **Prevent work-related injuries**

Tasks:
Describe the importance of safe working attitudes
Apply first-aid and CPR
Wear protective gear including:
a. hardhats
b. eye and ear protection
c. respirators
d. gloves
e. chaps
f. safety lines
g. boots and steel-toed boots

Follow safety procedures for:
a. boats and aircraft
b. chemicals and explosives
c. construction materials
d. driving
e. hand and power tools
f. hazardous wastes and carcinogens
g. soldering
h. wildlife and domestic animals
i. working in enclosed areas
j. heavy equipment
k. ladders and scaffolds
l. lifting
m. noise
n. electricity
o. extreme weather conditions
p. flammables

Discuss special safety considerations relevant to each non-renewable natural resources area

Competency: **Follow OSHA guidelines**

Tasks:
Explain the purpose of the Occupational Safety and Health Act
Describe your rights under workers-right-to-know and other portions of the act
Explain how to resolve hazardous and OSHA violations situations

Competency: **Maintain good health for effective job performance**

Tasks:
Exercise regularly
Eat properly

Get adequate rest
Explain the issue of smoking on the job
Refrain from drug abuse
Identify the hazards of job-related infectious diseases and how to avoid them

Competency: **Manage personal responsibilities related to employment**

Tasks:
Secure adequate transportation
Identify adequate child care alternatives
Secure appropriate child care
Use independent living skills
Develop a personal finance plan to manage personal finances

Competency: **Use personal management skills**

Tasks:
Demonstrate personal money management
Identify personal financial needs
Prepare a monthly budget
Balance a checkbook
List types of savings plans
Identify different credit plans
Prepare income tax forms
Identify payroll deductions

Competency: **Make career choices**

Tasks:
Conduct a self-assessment:
a. assess values in relation to work
b. recognize skills and aptitudes
c. assess employment history and experience
d. describe obstacles to employment

Identify career clusters:
a. list specific jobs and duties within clusters
b. describe apprenticeship/training programs
c. describe advanced training opportunities

Use labor market information:
a. identify how to find job information
b. describe the current local, state, national and international labor market
c. identify growth/demand occupations
d. relate career choices to local labor market

Select a career goal:
a. list how skills could be used in other jobs
b. develop specific steps to reach goal

Competency: **Evaluate jobs in non-renewable natural resources**

Tasks:
Identify educational and occupational opportunities such as:
a. adult, postsecondary vocational training
b. special grants from industry
c. federal, state, and local funding

Identify federally-mandated safety training
Locate resources for finding employment
Confer with prospective employers in the area of interest
Explain employment opportunities and requirements for jobs in:
a. surface mining
b. underground mining

c. coal mining
d. placer mining
e. sand and gravel operations
f. marine mining
g. government regulator
h. environmental consultant
i. transportation system
j. exploration and development

Explain the work of gas and petroleum workers such as:

a. archaeological technician
b. derrick worker
c. draftsperson
d. driller
e. floor worker
f. geological assistant
g. hazardous wastes technician
h. heavy equipment operator
i. instrument technician
j. laboratory technician
k. maintenance personnel
l. mud engineer
m. petroleum engineer
n. petroleum engineer/ engineer's aide
o. production operator
p. pump station technician
q. roustabout
r. security and safety officer
s. state and federal gas and petroleum regulator
t. surveying technician
u. truck driver

Explain the work of mining workers such as:

a. assayer
b. caretaker
c. chain worker
d. customs technician
e. driller
f. driller's helper
g. draftsperson
h. environmental technician
i. explosives technician
j. geological assistant
k. hard rock miner
l. heavy equipment operator
m. instrument technician
n. laboratory technician
o. longshore worker
p. machinist
q. maintenance personnel
r. mill worker
s. millwright
t. mine electrician
u. mine safety officer
v. mining engineer's aide
w. pipe worker
x. powder worker
y. reclamation technician
z. security officer
aa. state and federal mining regulator
bb. surveyor's helper
cc. timber worker
dd. tire worker
ee. track person
ff. truck driver
gg. welder

Explain the importance of non-renewable natural resource jobs to rural Alaska, especially in:

a. Circle City/Circle Hot Springs
b. Dutch Harbor
c. Healy
d. Kotzebue
e. Manley
f. McGrath
g. Nome
h. Southeast Alaska
i. Tok
j. Wiseman

Describe how work in non-renewable natural resources often keeps the employee away from home, often in rural surroundings, for extended periods of time

Competency: **Prepare a resume and job application**

Tasks:

Obtain a social security number
List:

a. past and present work experiance
b. hobbies and interests
c. community activities or memberships
d. in-school activities or memberships
e. awards, positions, or club offices
f. adult references, including addresses and phone numbers

Obtain extra copies of applications
Read job applications carefully
Follow instructions
Complete all items accurately
Write legibly
Use a word processor/typewriter
Verify references before listing them
Use n/a for items which do not apply

Competency: **Write a cover letter**

Tasks:

Explain when and how to write a cover letter
List the things the cover letter must include
Explain what a writing sample tells a potential employer

Competency: **Prepare for an interview**

Tasks:

Contact an employer to schedule an interview
Explain how to respond if asked to come for an interview
Describe questions and responses asked in an interview
Explain proper etiquette for an interview
Dress appropriately for an interview

Competency: **Follow up the interview**

Tasks:

Analyze the interview
Write a follow-up letter or call
Write a thank-you note or make a follow-up call

Competency: **Understand employee rights and responsibilities**

Tasks:

Explain state labor laws relating to compensation
Complete tax forms
Describe:

a. minimum wage and types of exempt businesses
b. employee benefits, rights and responsibilities
c. labor contracts, grievance procedures and the role of unions

Describe a sample personnel policy

Competency: **Use proper job resignation procedures**

Tasks:

Write a letter of resignation
Make final settlements (e.g. retirement, physical injury, social security, severance pay, etc.)

Introduction to Non-Renewable Natural Resources

(A) Indicates advanced competency or task

I. An overview of non-renewable natural resources

Competency: **Understand non-renewable natural resources**

Tasks:

Define terms associated with non-renewable natural resources including:

a. capital resources
b. carrying capacity
c. conservation
d. depletable
e. development
f. estimated reserves
g. human resources
h. multiple use planning
i. natural resource
j. non-renewable
k. preservation
l. production
m. proven reserves
n. reclamation
o. renewable
p. strategic minerals
q. sustained yield

Identify the difference between fuel and non-fuel natural resources such as:

a. minerals
b. petroleum
c. soil

Recognize scarcity and immobility of mineral resources including:

a. area impacted
b. difficulties of exploration and development
c. access routing
d. infrastructure requirements
e. availability of land

Explain importance of minerals to human use including:

a. modern technology
b. contrast metal use: first and third worlds
c. strategic minerals: Alaska's abundance
d. economic security
e. fuel resources

Competency: **Understand basic geologic processes**

Tasks:

Explain geologic processes including:

a. concept of geologic time
b. rock and mineral formation
c. structural geology
d. geomorphology

Explain formation of mineral resources including:

a. placer deposits
b. marine deposits
c. generation of hot fluids
d. magmatic deposits
e. metamorphic deposits

Explain important elements of Alaska geography and geology including the:

a. North Slope
b. Brooks Range
c. Seward Peninsula
d. Interior
e. South Central
f. Alaska Range
g. Aleution Chain
h. Southeast

II. History

Competency: **Understand the history of mining in Alaska**

Tasks:

Identify logistics of exploration in 19th -century Alaska
Trace Alaskan mining history including:

a. Native Alaskan use of fuels, minerals, rocks and metals
b. Russian settlers
c. 1867 - Alaska transfer
d. early mineral exploration
e. 1897-98 Klondike rush
f. Nome
g. boom and bust
h. Fairbanks
i. Kennecott
j. World War I: Alaska is strategic mineral producer
k. World War II: gold mines shut down
l. post-war exploration and discovery
m. 1970s - exploration boom
o. 1980s - development of mines
p. role of new technology

Identify problems of mineral development in Alaska today including:

a. lack of infrastructure
b. transportation and access problems and costs
c. deficiency of vocationally-trained workers to be informed of job opportunities (where the jobs are, when to apply, interviews etc.)
d. scarcity of land available
e. environmental concerns and pressures
f. regulations

Explain the boom and bust cycle in terms of exploiting any depletable natural resource
Identify important Alaskan mining towns still surviving, such as Wiseman, Juneau, Douglas, Central, Fairbanks, Nome, etc.
Explain the reasons for building the Alaska railroad
Explain the relationship between mining and the growth of aviation and highways

Competency: **Understand social change related to non-renewable natural resource development in Alaska from statehood to present**

Tasks:

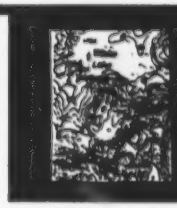
Describe how regulations are made
Identify goals of public land policy
Explain how the need for employment interacts with development of non-renewable natural resources in communities
Describe the social changes in Alaska which are likely to result from further development in Alaska (economic, political, and cultural)
Describe the natural resource impacts of highways, pipelines, and seaports on non-renewable natural resources in Alaska
Describe the issues of development versus conservation in Alaska

III. Laws, economics, and land ownership

Competency: **Understand laws related to Alaska's non-renewable natural resources**

Tasks:

Explain the purpose of public law in natural resource management
Distinguish between statutes, regulations, and guidelines
Trace development of a law from concept to acceptance



Identify laws related to placer mining runoff water quality
Identify laws related to logging in the national forests
Identify laws related to resource development in national parks, national monuments, and national wildlife refuges

Competency: **Understand issues related to land ownership and management**

Tasks:

Identify the land ownership role of the Alaska Statehood Act
Identify the importance of ANCSA/1991 to Native land ownership in Alaska
Identify the importance of ANILCA to land ownership in Alaska
Examine the role of the following agencies in land management in Alaska:

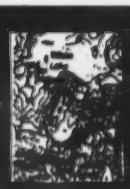
a. Bureau of Land Management (BLM)
b. City and Borough
c. Coastal Zoning Management
d. Corps of Engineers
e. Department of Environmental Conservation
f. Department of Nat. Resources, State of Alaska
g. Environmental Protection Agency
h. Mine Safety Health Administration
i. National Park Service
j. regional Native corporations
k. U.S. Fish and Wildlife Service
l. U.S. Forest Service
j. Village corporations

(A) Competency: **Understand economics related to non-renewable natural resources**

Tasks:

Identify annual gross receipts of Alaskan non-renewable natural resource industries
Contrast renewable with non-renewable natural resource industries
Identify yearly production and value trends of Alaskan fuel and non-fuel resources including (ie., production from Red Dog and Green's Creek Mines):

a. petroleum
b. natural gas
    1. liquified natural gas (LNG)
    2. urea
c. petroleum by-products
    1. kerosene
    2. gasoline
    3. asphalt
d. metallic minerals
    1. gold
    2. silver
    3. platinum group metals
    4. zinc
    5. lead
    6. arsinic
    7. molybdenum
    8. copper
e. non-metallic minerals
    1. barite
    2. asbestos
f. art and decorative stone
    1. granite
    2. marble
    3. soapstone
    4. jade



5. gems

e. coal
   1. power generation
   2. domestic heating
   3. export

f. sand and gravel
   1. road bed construction
   2. airport construction
   3. land fills and general construction (foundations, etc.)
   4. water management construction (dams, etc.)

Identify the costs of mining resources including:
- a. exploration
- b. evaluation
- c. financing capital costs (mining and mill equipment)
- d. ore production
- e. processing
- f. refining
- g. transportation
- h. reclamation
- g. marketing

Evaluate resources estimating total value of content by:
- a. grade (mineral content per unit weight)
- b. size (length, width, depth, total tonnage)
- c. "real value" (recovered mineral less capital and operating cost) to account for time value of money, calculate net present value

Determine profit and production life of fuel and non-fuel natural resources:
- a. profit = total value of resource-total costs of extraction
- b. life of the venture=total size of the resource/rate of extraction
- c. analyze market demands and fluctuations
- d. estimate total return and rate of return on total investment over a given production life

IV. Other duties and skills

(A) Competency: **Maintain records related to fuel and non-fuel non-renewable natural resource extraction**

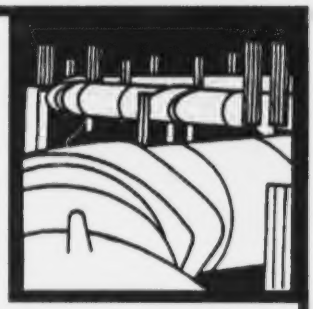
Tasks:

Plan daily tasks including:
- a. equipment needs
- b. personnel needs
- c. supplies and/or power needs
- d. transportation needs
- e. time required to complete
- f. costs
- g. inventory supplies on hand
- h. initiate purchase orders for supplies needed

Maintain daily logbook including:
- a. tasks completed
- b. people and/or equipment used
- c. man-hours for each task
- d. expendable items and/or supplies used
- e. expense records
- f. recommendations for continuence or discontinuence

Analyze profit or loss of venture by:
- a. recording capital investment costs
- b. recording equipment and labor costs
- c. recording income
- d. determining net worth

Gas and Petroleum



(A) Indicates advanced competency or task

I. Work with the Resource

Competency: **Obtain basic first aid certification**

Tasks:

Explain the importance of having first aid certification
Complete a first aid program such as:

a. MSHA first aid certification
b. OSHA first aid certification
c. Red Cross Basic first aid certification

Competency: **Follow safety regulations**

Tasks:

Wear clothes and equipment suitable for site including:

a. hardhat
b. steel-toed shoes
c. gloves
d. eye protection
e. ear protection
f. Self-Contained Breathing Apparatus (S.C.B.A.)
g. respirator, including half and/or full face mask

Identify state OSHA petroleum code, especially the flesh to mask seal of respirator (no beards or sideburns; no contact lenses)
Safely maneuver vehicles on ice
Observe company safety procedures
Utilize proper lifting techniques
Use standard hoisting techniques

II. Use the Resource

A. Retrieving the Resource

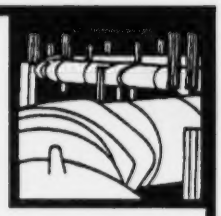
Competency: **Understand petroleum drilling techniques**

Tasks:

Define terms related to petroleum drilling including:

a. drilling
b. fold
c. geochemical
d. geophysical
e. nozzle
f. offshore platform
g. ooze
h. petroleum—oil, gas, water
i. permeability
j. porosity
k. reservoir
l. seismograph
m. source well
n. well
o. wildcat well

Identify components of a drilling rig
Explain oil and gas drilling techniques
Explain methods of blowout prevention
Name drilling innovations



Competency: **Understand petroleum production techniques**

Tasks:

Define terms related to petroleum production including:
- a. automated controls
- b. anti-foaming
- c. basic, sediment and water (B.S. & W.)
- d. emulsions
- e. dehydration
- f. gas compression
- g. gas treatment
- h. in situ combustion
- i. Leased Automatic Custody Transfer (L.A.C.T.)
- j. metering
- k. offshore platform
- l. steam flooding
- m. water injection

Differentiate between primary, secondary, and tertiary recovery of hydrocarbons
Differentiate between naturally flowing wells and methods of artificial lift
Identify different types of wells
Identify reasons for and methods used in well testing
Describe how to plug a well
Explain how a well is completed
Explain the factors determining the life of oil wells
Name ways to control production
Identify ways to stimulate production and enhance oil recovery

Competency: **Perform roustabout work**

Tasks:

Obtain CPR certification
Explain safety related to work on an oil rig
Drive a light truck including:
- a. obtaining or possessing a state driver's license
- b. driving safely in varying weather conditions
- c. driving safely in varying road conditions
- d. changing truck tire(s)
- e. checking engine fluids
- f. engaging four-wheel drive
- g. using a power winch

Use hand and power tools
Utilize principles of rigging, including:
- a. working with slings
- b. working with cable
- c. working with scaffolding

Chip and paint
Operate a forklift
(A) Complete oil spill response tasks
(A) Complete hydrogen sulfide (H2S) safety and response tasks
(A) Complete Hazardous Waste Site Operator tasks

(A) Competency: **Perform work as a roughneck**

Tasks:

Identify uses of drilling mud
Clean mud pump suction if necessary
Mix drilling mud
Attach pipe slings
Make up and break out tool joints

Guard against blowout
Guard against oil spills
Report all spills to supervisor
Clean up oil spills
Repair pipeline

(A) Competency: **Perform work as a derrick worker**

Tasks:
Conduct all of the duties of a roughneck
Work with drilling fluids including:
a. directing the preparation of drilling mud
b. analyzing composition of drilling mud
c. directing circulation of drilling mud
Supervise floormen and roughnecks
Guard against blowout
Guard against oil spills
Report all spills to supervisor
Clean up oil spills
Repair pipeline

(A) Competency: **Work as a driller**

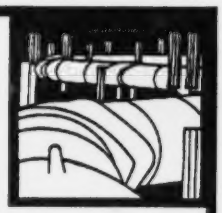
Tasks:
Conduct all of the duties of a derrick worker
Operate drillworks and associated systems
Supervise entire drilling group

(A) Competency: **Perform production operator work**

Tasks:
Follow all safety rules and regulations
Test well to determine:
a. production rate
b. gas/oil ratio
c. basic, sediment & water (B.S. & W.)
Check trends of oil tests
Monitor and compute chemical injection rates
Monitor and control water injection
Monitor and control gas injection
Monitor and control lift system
Operate:
a. turbines
b. compressors, including centrifugal and reciprocating
c. pumps
d. dehydration equipment
e. reboiler equipment
Identify use of Tri—Ethylene Glycol System (T.E.G.)

(A) Competency: **Perform instrument technician work**

Tasks:
Identify pneumatic and electronic control instruments, including level pressure and flow controls
Troubleshoot and repair instruments
Report faulty instruments to supervisor
Troubleshoot and repair gas detectors and fire prevention devices



(A) Competency: **Perform heavy equipment operator work**

Tasks:

Follow safety procedures for working with heavy equipment
Operate a rock truck or water truck
Operate a backhoe, both rubber-tired and steel track
Operate a bulldozer, both rubber and steel track
Operate a front-end loader, both track and rubber tire
Drive a dump truck
Operate a power shovel
Operate a D mag

B. Transporting the Resource

Competency: **Analyze petroleum transportation methods**

Tasks:

Describe marine, road, and rail transportation methods
Describe pipeline systems and their operation
Contrast types of pipelines including:

a. gathering lines
b. crude oil trunk lines
c. product trunk lines

C. Processing the Resource

Competency: **Understand petrochemical refining and manufacturing processes**

Tasks:

Explain petrochemical manufacturing terms and principles including:

a. cracking
b. cracking unit
c. fractionation
d. fractionating tower
e. isomerization/polymerization
f. pH
g. P.S.I.A. (Pounds Per Sq. In. Absolute)
h. P.S.I.G. (Pounds Per Sq. In. Gauge)

Explain properties of solids including:

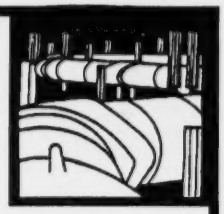
a. molecular structure
b. physical properties of solids
c. effect of temperature on solids
d. mass
e. density
f. elasticity
g. stress

Explain the principles of matter including:

a. forms of matter
b. structure of matter
c. molecular structure of solids
d. molecular structure of liquids
e. molecular structure of gases
f. movement of molecules

Explain properties of liquids including:

a. flow
b. wetting
c. capillary action
d. bouyancy
e. specific gravity
f. effects of temperature and pressure on liquids
g. flow and flow rate
h. flow and pressure



Explain the properties of gases including:
- a. effects of temperature and pressure on gases
- b. relationships between temperature, pressure and volume
- c. Boyle's Law
- d. Charles' Law
- e. The General Gas Law
- f. atmospheric pressure
- g. measuring pressure

Identify the petrochemical "building blocks", including carbon ring chain
Explain the manufacturing of petrochemicals
Identify methods of waste control
Identify fundamental processes of fire suppression and control

D. Utilizing and Maintaining Equipment

Competency: **Use hand and power tools**

Tasks:

Demonstrate the use of hammers including:
- a. ball peen
- b. soft face
- c. claw
- d. sledges

Demonstrate the use of pliers including:
- a. channel lock
- b. diagonal cutting
- c. lock ring
- d. needle nose
- e. slip joint
- f. snap ring
- g. vise grip

Demonstrate the use of screwdrivers including:
- a. standard slot types
- b. phillips
- c. offset
- d. clutch head
- e. torque head

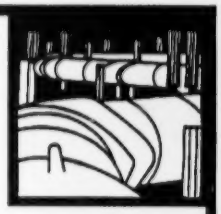
Demonstrate the use of:
- a. chain saws
- b. chisels
- c. circular saw
- d. die
- e. drill press
- f. drills and drill bits
- g. files
- h. grind wheel
- i. hack, hand, and power saws
- j. helicoil
- k. paint sprayers
- l. pick
- m. pipe wrenches
- n. pry bars
- o. reamer
- p. shovel
- q. socket and open wrenches
- r. steel rules
- s. tap
- t. torque wrenches

Demonstrate the use of reclamation equipment including:
- a. fertilizer spreader
- b. rake
- c. seed spreader
- d. sprinkler
- e. tractor
- f. wheelbarrow

Competency: **Use pneumatic tools**

Tasks:

Observe safety procedures related to pneumatic tools
Operate pneumatic cutting tools
Operate a pneumatic wrench
Use a jackhammer



Competency: **Weld metal**

Tasks:
Dress properly for cutting and welding wearing:
a. eye protection
b. apron
c. gloves
d. foot protection
Prepare surfaces to be welded
Select proper welding rods and flux
Select proper amperage and current flow
Position and secure the cables for the welding project
Remove burrs and sharp edges
Determine quality of the weld
Maintain welding tools

Competency: **Operate hand-held radios**

Tasks:
Carefully handle and stow radio
Select proper channel(s)
Change radio battery
Maintain proper courtesy and clarity on the radio
Obtain a 3rd-class radio license

Competency: **Operate a computer**

Tasks:
Boot-up computer system
Access program
Save information

III. Manage and Protect the Resource

Competency: **Observe rules related to environmental protection**

Tasks:
Dispose of refuse in designated areas
Keep vehicles on designated roadways
Observe company rules pertaining to wildlife protection
Report all oil and chemical spills to supervisor

Competency: **Clean up (abate) oil spills**

Tasks:
Wear protective clothing including self-contained breathing apparatus
Construct containment dikes
Deploy containment booms
Put out absorbant materials
Use skimmers on water
Operate clean-upboat
Assist with wildlife cleanup and/or protection

Competency: **Maintain facilities security**

Tasks:
Check doors and fences
Identify unfamiliar people and situations
Identify and report facility safety hazards
Check required permits

IV. Define the Resource

Competency: **Locate potential petroleum deposits in Alaska**

Tasks: Identify the location of:

a. Arctic National Wildlife Refuge
b. Beaufort Sea
c. Bristol Bay
d. Chukchi Sea
e. Cook Inlet
f. Katalla
g. National Petroleum Reserve
h. Navarin Basin
i. North Aleutian Trench
j. North Slope
k. Norton Basin
l. St. George Basin

(A) Competency: **Understand how oil is formed**

Tasks: Explain:

a. geological theories of oil formation
b. promising formations in which to find oil
c. promising geologic structures in which to find oil
d. the differences between oil and gas reservoirs

V. Identify the Importance of the Resource

Competency: **Understand the history of oil exploration**

Tasks: Trace history of the oil industry
Describe oil exploration techniques
Trace changes in oil drilling technology
Describe the relationship between automobile use and availability of cheap oil

Competency: **Understand the use of petroleum products**

Tasks: Describe the use of petroleum products such as:

a. gasoline
b. diesel fuels
c. fuel oils
d. asphalt
e. jet fuel
f. plastics
g. geotextiles
h. other consumer products

Competency: **Understand the petroluem manufacturing process**

Tasks: Identify the manufacture and uses of:

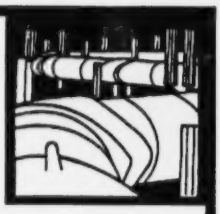
a. kerosene
b. gasoline
c. jet fuel
d. liquefied petroleum gas (LPG)

Explain the issue of petroleum product quality

Competency: **Understand alternative fuel development**

Tasks: Explain the importance of increasing energy production and finding new energy sources
Analyze the impact and relationship of alternative sources of energy on the petroleum industry including:

a. biomass
b. energy conservation
c. hydroelectric power
d. nuclear
e. organic waste power
f. solar power
g. tidal power
h. wind power



Explain:
- a. the importance of oil shale and tar sands to expanding energy sources
- b. how coal is liquified for fuel
- c. the impact of renewable energy sources on the energy industry
- d. the impact of alcohol fuel and geothermal power on the energy industry
- e. the value of petroleum products in environmental and health research
- f. conservation's role as an energy source

(A) Competency: **Analyze the importance of oil to Alaska's economy**

Tasks:
Name the major oil-producing nations
Identify the impact of state and local regulations and taxes on oil development
Relate factors influencing the future of the oil and gas industry in Alaska
Explain the relationship of the tax base to oil exploration and production in Alaska, especially in terms of the Economic Limiting Factor (E.L.F.)

(A) Competency: **Market oil products**

Tasks:
Describe how oil products are moved to market
Explain the issue of intermediate stops such as terminals and bulk plants in moving oil products to market
Explain the business of oil products retailing

VI. Identify competing uses

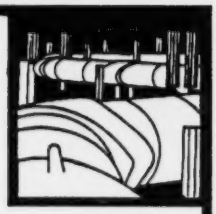
Competency: **Understand land-use issues related to petroleum exploration and extraction in Alaska**

Tasks:
Explain the:
- a. process of ANCSA, ANILCA, and D-2 and their relationship to the construction of the Trans-Alaska oil pipeline
- b. issue of drilling for oil on the Arctic coastal plain
- c. issue of possible oil spills from offshore drilling

Competency: **Understand environmental impacts of energy extraction**

Tasks:
Explain ways the petroleum industry needs to protect the environment including:
- a. reducing emissions and odors at refineries
- b. producing low-sulfur heating oil and residual fuel oil
- c. meeting federal, state and/or company policy in returning water to rivers or streams at the same or an improved purity
- d. reducing refinery discharges
- e. preventing, controlling, cleaning up, and monitoring oil spills
- f. reimbursing victims of oil spills
- g. preventing and controlling offshore blowouts

Explain:
- a. ways to prevent oil spills
- b. possible oil spill effects on the food chain
- c. environmental safeguards of pipelines and refineries
- d. the relationship between burning fossil fuels and the greenhouse effect



Competency: **Understand the role of organizations and agencies involved with gas and petroleum development**

Tasks: Identify the role of:

a. Alaska Department of Environmental Conservation
b. Alaska Department of Fish and Game
c. Alaska Geological Society
d. Alaska Mineral and Energy Resource Education Fund (AMEREF)
e. Alaska Oil and Gas Association
f. Alaska Oil and Gas Conservation Commission
g. Alaska OSHA
h. American Institute of Professional Geologists
i. American Petroleum Institute
j. Bureau of Land Management
k. Environmental Protection Agency
l. Federal Water Pollution Control Administration
m. Fish and Wildlife Service
n. International Brotherhood of Electrical Workers Union
o. Laborers' and Hod Carriers' Union
p. National Park Service
q. Native corporations
r. Operating Engineers Union
s. Resource Development Council
t. Soil Conservation Service
u. State of Alaska Department of Natural Resources
v. State of Alaska Division of Geological and Geophysical Surveys
w. State of Alaska Division of Land and Water Management
x. State of Alaska Division of Mining
y. State of Alaska Division of Parks and Outdoor Recreation
z. Teamsters
aa. U.S. Army Corps of Engineers
bb. U.S. Bureau of Alcohol, Tobacco, and Firearms (regulates explosives)
cc. U.S. Bureau of Mines
dd. U.S. Coast Guard
ee. U.S. Department of Energy
ff. U.S. Department of Labor
gg. U.S. Forest Service
hh. U.S. Geological Survey
ii. U.S. Mine and Safety Health Administration
jj. U.S. Office of Strategic Minerals
kk. Water Pollution Control Federation
ll. Water Resources Council

Mining

(A) Indicates advanced competency or task

I. Work with the Resource

Competency: **Obtain first aid certification**

Tasks:

Explain the importance of having first aid certification
Complete a first aid program such as:

a. MSHA first aid certification
b. OSHA first aid certification
c. Red Cross Basic first aid certification

Competency: **Use safe working practices**

Tasks:

Identify hazards at the job site
Wear clothes and equipment suitable for mining site including:

a. eye protection
b. gloves
c. hardhat
d. ear protection
e. gas detectors
f. lamp
g. safety lamp
h. self rescuers
i. steel-toed shoes

Follow MSHA safety regulations and guidelines
Identify various signals related to mining including:

a. lamp signals
b. sound signals (surface—blasting safety; underground—hoisting signals)

A. Understand mining techniques

Competency: **Use mineral location and extraction techniques**

Tasks:

Define terms and techniques related to mineral location and extraction including:

a. adit
b. aerial photography
c. aerial status maps
d. anomaly
e. assessment
f. back
g. blasting agents
h. channel, core, geological, slurry)
i. clean-up
j. concentrate
k. dozing
l. dredging
m. drift mining
n. drilling
o. dynamite
p. exploration
q. explosives
r. face
u. geologic mapping
v. geophysical techniques
dd. mucking
ee. nozzle
ff. ore reserves and resources
gg. overburden
hh. placer mining
ii. portal
jj. quarrying
kk. raise
ll. recoverable value
mm.recycling
nn. retorting
oo. ribs
pp. riffles
qq. roof bolting
rr. scientific sampling-bulk,chip
ss. settling and polishing ponds
tt. shaft
uu. shoring
xx. sluice boxes
yy. stripping ratio

w. ground support
x. hanging wall
y. heading
z. loading and shooting the hole
aa. milling
bb. mineral location
cc. mining claim
zz. tailings
aaa. timbering
bbb. tunnel
ccc. underground mining
ddd. vein
eee. ventilation
fff. winze

Explain methods of prospecting
Describe mineral exploration, development, production, processing, and reclamation
Differentiate between placer, open pit, underground, marine, and solution mining
Explain geophysical techniques, including:

a. Induced Polarization (IP)
b. radiometric surveys
c. magnetic surveys
d. resistivity
e. Self-Potential (S.P.)
f. electromagnetic (EM)

Explain methods of ground support including:

a. timber
b. roof bolts
c. shotcrete
d. cribbing

Explain safe handling of explosives

Competency: **Understand metal production**

Tasks:
Define terms related to metal production
Identify characteristics of various metals
Trace steps in production from mine site to market

Competency: **Operate drilling equipment**

Tasks:
Identify drilling terms
Scientificly sample using statistics
Recognize potential hazards related to drilling
Identify and compare exploration, blast hole, and production drilling

(A) Competency: **Lay track**

Tasks:
Use track-laying tools including:

a. fish plates
b. Jim Crow
c. level
d. signal
e. track bar
f. track gauge
g. track hammer
h. track tongs

Prepare sill
Set ties
Lay out spacing and curvature on rails
Maintain grade
Spike track down
Ballast the track
Set switches
Repair track

B. Use and maintain tools related to mining

Competency: **Use hand and power tools**

Tasks: Identify the use of tools including:

a. air and electric saw
b. bar
c. buzzy wrench
d. claw
e. fin hoe
f. gas chain saw (not underground)
g. motor jack
h. rail jack
i. scaling bar
j. sledge (double jack)
k. sounding bar
l. swede saw

Competency: **Use mine maintenance tools**

Tasks: Use:

a. chisels
b. die
c. drill press
d. drills and drill bits
e. files
f. grind wheel
g. hack, hand, and power saws
h. pliers
i. helicoil
j. pick—right and left hand
k. socket and open wrenches
l. steel rules
m. tap
n. torque wrenches
o. screwdrivers

Use underground tools:

a. muck stick
b. pipe wrenches
c. scaling bar
d. timber pick

Competency: **Timber**

Tasks: Define the use of:

a. air saws
b. bin-line blocks
c. breast board
d. caps
e. chimneys
f. chute gate
g. cribbing
h. girt
i. gob fence
j. knee brace
k. lacing
l. ladders
m. lagging
n. pony set
o. posts
p. scaffold
q. sill plate
r. square-set
s. staging
t. swede saw
u. ties
v. timber pick
w. timberman's staff
x. toe rail
y. trapezoid
z. wedges
aa. yankee bin

Install timber for ground support
Install bulkheads
Install air doors
Raise timber
Shaft timber

C. Use and maintain equipment related to mining

Competency: **Maintain mine machinery**

Tasks:

Explain systematic approaches to troubleshooting engines and engine systems (gas and diesel engines not used underground)
Identify requirements for an engine to run including:
- a. compression
- b. ignition
- c. carburetion

Check oil and fluids
Follow basic troubleshooting procedures including:
- a. checking for spark
- b. checking for fuel
- c. checking for compression
- d. checking plugs
- e. checking points

Check sump pumps, air and electric
Check electric equipment including:
- a. couplings
- b. pressures
- c. meters
- d. gauges

Check diesel equipment including:
- a. all gauges
- b. Murphy gauges
- c. glow plugs
- d. exhaust
- e. fuel injectors

(A) Competency: **Use heavy equipment**

Tasks:

Follow maintenance and operating procedures
Operate a backhoe
Operate front end loader, both track and rubber tire
Operate bulldozers, both track and rubber tire
Operate power shovel, drag line or dredge

(A) Competency: **Use underground machinery**

Tasks:

Operate jumbos (mobile drilling equipment), including:
- a. pre-shift inspection and walk-around
- b. identifying bits
- c. maintain elevation and direction (parallax)
- d. collaring hole
- e. selecting steel
- f. changing bits
- g. adjusting rotation, feed pressure, and water

Operate other underground machinery including:
- a. haul truck
- b. jack leg
- c. mine hoist
- d. overshot mucking machines
- e. raise climbers
- f. scoop tram
- g. slushers
- h. tugger

(A) Competency: **Handle explosives**

Tasks: Use safety procedures for handling:
- a. blasting caps
- b. blasting agents
- c. other explosive materials

D. Placer mine

(A) Competency: **Develop a placer mine**

Tasks:
Maintain records related to mining enterprise
Prospect mine site and make discovery of placer minerals
Obtain mineral rights to discovery
Complete evaluation and feasibility study
Develop mining plan
Obtain necessary permits
Transport equipment and grubstake to site
Construct shelter
Operate heavy equipment
Build settling ponds
Make mining cut
Wash material
Assay and market placer minerals
Reclaim mine site

E. Subsurface mine

(A) Competency: **Perform underground mine work**

Tasks:
Wear all required mining clothing and equipment
Follow all mine safety rules and regulations
Develop underground mining method
Operate heavy equipment
Operate drills—jumbo and jack leg, sinking hammer, stoper (buzzy)
Conduct ground support operations
Safely blast the rock
Muck the mined material
Lay track
Apply for MSHA underground safety and task training certificate

F. Surface mine

(A) Competency: **Work in a surface mine**

Tasks:
Wear all required mining clothing and equipment
Follow all mine safety rules and regulations
Explain overburden removal
Identify problems of slope stability and stripping ratio
Operate heavy equipment
Operate drills—exploration and blast hole
Remove overburden
Safely blast the rock
Apply for MSHA required surface safety and task training certificate

(A) Competency: **Use heavy equipment**

Tasks:
Use a small loader
Operate a haul truck or water truck
Operate a backhoe, both rubber-tired and track
Operate a bulldozer, both rubber and track
Operate a front-end loader, both track and rubber tire
Operate a power shovel or drag line

(A) Competency: **Drive a haul truck**

Tasks:
Start vehicle
Remove and set brake
Operate vehicle at safe speeds
Safely back vehicle
Load truck
Dump load

G. Marine Mine

(A) Competency: **Perform marine mine work**

Tasks:
Wear all required mining clothing and equipment
Follow all mine safety rules and regulations
Obtain Coast Guard safety training
Obtain helicopter safety training
Explain offshore mining methods
Explain the geology of offshore deposits
Discuss the beach deposits in Nome
Apply for MSHA Safety and Task Certificate

H. Operate tourist mine site

Competency: **Maintain a rock collection**

Tasks:
Read maps in the field
Collect specimens using scientific principles
Identify specimens using published rock keys
Polish rocks
Display rocks
Join a rock club or professional organization

(A) Competency: **Manage a tourist attraction**

Tasks:
Obtain necessary permits for operation
Construct tourist facilities
Advertise the operation
Interpret site history to visitors
Gold pan
Maintain records related to enterprise

(A) Competency: **Operate a small suction dredge**

Tasks:
Compare different types of dredges
Acquire mineral rights to site
Secure necessary permits

Assemble selected dredge at site
Remove surface material by hand or with heavy equipment
Prepare bedrock for dredging
Remove material from bedrock with dredge
Direct dredged material to settling pond
Sluice material collected
Maintain and repair dredge engine and pump

I. Process minerals

Competency: **Understand mineral processing**

Tasks: Define terms important to mineral processing including:

a. alloy
b. assaying
c. benefication
d. classification
e. comminution
f. electrolysis
g. extractive metallurgy
h. flotation
i. flow diagram
j. heap leaching
k. jig concentrators
l. manufacturing
m. metallurgy
n. milling
o. processing
p. recoverable ore
q. refining
r. smelting and refining
s. tailings
t. vat leaching

Describe the process of milling the ore
Explain how ore is turned into metal
(A) Operate smelting equipment
(A) Operate mill equipment

III. Manage and Protect the Resource

Competency: **Understand regulations related to mining**

Tasks: Identify state, city and borough, and federal agencies that regulate mining
List permits necessary for mining operations

(A) Competency: **Monitor mine site**

Tasks: Collect and test samples including:

a. water quality samples: turbidity, settleable solids and heavy metals
b. air pollution and noise

(A) Competency: **Reclaim mine site**

Tasks: Prepare site
Recontour and rechannel drainage
Revegetate
Operate a tractor
Operate a bulldozer

IV. Define the Resource

Competency: **Understand basic geology**

Tasks: Use techniques for rock and mineral identification
Classify rocks and minerals according to type including:

a. igneous

b. sedimentary
c. metamorphic

Identify rocks and minerals and other materials such as:

a. basalt
b. coal
c. gabbro
d. gneiss
e. granite
f. limestone
g. marble
h. quartz
i. rhyolite
j. sandstone
k. schist
l. shale
m. slate

Explain the rock cycle
Discuss tectonics
Identify folds and faults
Explain geomorphology

Competency: **Understand geological theories**

Tasks:

Define terms related to geology including:

a. coal
b. crust
c. crystallography
d. density
e. erosion
f. gossan
g. magma
h. mineralization
i. ore
j. peat
k. platinum
l. rare earths
m. rift
n. stratigraphy
o. strike slip fault
p. subduction zone
q. uplifted
r. volcanoes
s. weathering
t. zoning

Differentiate between sedimentary, igneous and metamorphic rock
Explain the theory of plate tectonics
Explain the relationship between:

a. plate tectonics and mineral deposits
b. weathering processes and mineral deposits

Competency: **Understand the important mineral resources in Alaska**

Tasks:

Identify fuel and non-fuel resources important to Alaska's mining industry including:

a. aggregate
b. antimony
c. building stone
d. chrome
e. coal
f. cobalt
g. copper
h. gold
i. jade
j. lead
k. mercury
l. molybdenum
m. nickel
n. petroleum
o. platinum group elements
p. rare earth elements
q. silver
r. tungsten
s. uranium
t. zinc

Explain the basic non-fuel materials used in building and construction, including:

a. barite
b. clay
c. gypsum
d. iron
e. limestone
f. marble
g. soapstone

Define strategic minerals

Competency: **Understand features of Alaska's geology**

Tasks:

Explain the formation of the:
- a. Alaska Range
- b. Brooks Range

Explain the role of plate tectonics in Alaska's geology

Locate Alaska's coal reserves including:
- a. Bering River coal field
- b. Beluga coal field
- c. Healy coal field (within Nenana Coal Trend)
- d. North Slope coal fields
- e. Matanuska coal field
- f. Susitna Flats/ Upper Cook Inlet
- g. Point Lisburne coal field

Locate Alaska's gold /silver/zinc/copper mines including:
- a. Ambler District
- b. Chichagof , Sitka, and Hirst Chichagof
- c. Circle Mining District
- d. Fairbanks Mining District
- e. Greens Creek
- f. Iditarod/Flat
- g. Juneau gold belt
- h. Kantishna Mining District
- i. Kennicott
- j. Kodiak District
- k. Koyukuk Mining District
- l. Nabesena
- m. Nome Mining District
- n. Nyac
- o. Red Dog Mine
- p. Ruby
- q. Valdez Creek
- r. Wiseman/Nolan

Locate Alaska's sand and gravel and building stone sites, including:
- a. Fairbanks
- b. Cordova
- c. North Slope
- d. Palmer

Competency: **Use field tools**

Tasks:

Demonstrate use of:
- a. topographic maps
- b. geologic maps
- c. a compass

V. Identify the Importance of the Resource

Competency: **Understand mining issues in Alaska**

Tasks:

Explain:
- a. the importance of minerals to society
- b. mining issues in relation to Native land issues
- c. the water quality problems of placer miners
- d. how markets determine whether mining deposits are developed
- e. the importance of Alaska to national and world energy markets

Explain the impact of the following on mineral prices:
- a. value of the dollar
- b. inflation
- c. demand
- d. new technology
- e. political stability
- f. recycling

Explain the Pacific Rim and its importance as a market for Alaska's minerals

Locate other mineral exporting nations on the Pacific Rim

Explain the competitive advantages and disadvantages of different nations on the Pacific Rim

Locate Alaskan seaports suitable for shipping minerals

Explain Alaska mineral transportation problems including RS 2477 access routes

Discuss the employment potential of surface and underground mining versus potential environmental impact

VI. Identify competing uses

Competency: **Understand environmental and social concerns related to mining**

Tasks:

Explain environmental and social concerns related to mining including:

a. land status
b. stream quality
c. land reclamation
d. mineral deposits in parks and wildlife preserves

Explain the impact of roads and mining roads on:

a. rural and/or Native villages
b. wildlife
c. other development projects

Competency: **Understand the role of agencies and organizations involved with mining**

Tasks:

Identify the role of:

a. Alaska Department of Environmental Conservation
b. Alaska Department of Fish and Game
c. Alaska Department of Natural Resources
d. Alaska Division of Geological and Geophysical Surveys
e. Alaska Division of Land and Water Management
f. Alaska Division of Mining
g. Alaska Geologic Society
h. Alaska Miner's Association
i. Alaska Minerals & Energy Resource Education Fund (AMEREF)
j. Alaska Oil and Gas Association
k. Alaska OSHA
l. Alaska Women in Mining
m. American Institute of Mining & Metallurgy
n. American Institute of Professional Geologists
o. American Mining Congress
p. Bureau of Land Management
q. Environmental Protection Agency
r. Federal Water Pollution Control Administration
s. Fish and Wildlife Service
t. IBEW Union
u. Laborer's and Hod Carrier's Union
v. local mining districts
w. Miners Advocacy Council
x. National Park Service
y. Native corporations (village and regional)
z. Operating Engineers Union
aa. Placer Miners of Alaska
bb. Resource Development Council
cc. Society of Mining Engineers
dd. Teamster's Union
ee. U.S. Army Corps of Engineers
ff. U.S. Bureau of Alcohol, Tobacco, and Firearms (regulates explosives)
gg. U.S. Bureau of Mines
hh. U.S. Coast Guard
ii. U.S. Department of Energy
jj. U.S. Department of Labor
kk. U.S. Forest Service

ll. U.S. Geological Survey
mm. U.S. Mine and Safety Health Administration
nn. U.S. Office of Strategic Minerals
oo. Water Pollution Control Federation
pp. Water Resources Council
qq. Wilderness Society

IV
Course Descriptions

Course Descriptions

The brief course descriptions provide conceptual frameworks for the design and implementation of a balanced program in non-renewable natural resources. Teachers can use these descriptions to organize course offerings in a non-renewable natural resources education program. These descriptions are examples of content organization and are too brief for purposes of program approval. Local schools will have to provide more definition regarding the content of their courses than is reflected in these course descriptions.

Course: Introduction to Non-Renewable Natural Resources/Mining
Length: One year or semester
Grades: 9-12

A course that provides an overview of non-renewable natural resources (both fuel and non-fuel) including terms, geologic processes, mining history, social change, natural resource law, land ownership and management, and economics related to non-renewable natural resources. Students will also be introduced to mining technology.

Course: Introduction to Non-Renewable Natural Resources/Gas and Petroleum
Length: One year or semester
Grades: 9-12

A course that provides an overview of non-renewable natural resources (both fuel and non-fuel) including terms, geologic processes, drilling history, social change, natural resource law, land ownership and management, and economics related to non-renewable natural fuel resources. Students will also be introduced to gas and petroleum technology.

Course: Mining
Length: One year or semester
Grades: 9-12

A course in mining technology, including first aid , mining techniques, tools, and equipment. Students will study placer, subsurface, surface, marine, and recreational mining, as applicable to their interests. Students will study basic geology and mineral development.

Course: Gas and Petroleum
Length: One year or semester
Grades: 9-12

A course in gas and petroleum technology, including first aid, safety, drilling, and production techniques, roustabout training, and utilizing and maintaining equipment. Students will study management and protection of the resource as well as basic economics related to Alaska's economy. Students will also identify competing uses of Alaska's petroleum resources.

V
Curriculum Analysis Matrices

Curriculum Analysis Matrices

Identified Competencies by Course Offerings

This competency checklist should be used by teachers in identifying competencies to be included in specific classes in Non-Renewable Natural Resources education. This checklist is a curriculum analysis tool for use by teachers in assigning responsibilities for the competencies of a total Non-Renewable Natural Resources education program.

All courses taught in the Non-Renewable Natural Resources education program are identified in the columns at the top of the matrix. The individual competencies can be allocated to specific courses. One method for analyzing the competency list is to assign letters where the competency will be introduced (I), taught (T), or mastered (M). Curriculum sequences can be organized through this approach.

To assist teachers to reinforce basic skills instruction, competencies have been cross-referenced with the following academic areas:

Math (M)	Science (S)
Social Studies (SS)	Language Arts (LA)

This will assist local school districts in awarding cross-credit (academic credit) for participation in vocational classes they deem appropriate.

The following checklists are also cross-referenced with pre-employment competencies and student leadership competencies. The Job Training Partnership Act provides funds to train economically disadvantaged youth to enter and succeed in employment. Each Private Industry Council responsible for administering these funds adopted youth pre-employment competencies as one of the measures for positive termination for program participants. The other measures are attained through unsubsidized employment, or through another training program.

The following categories of work-related knowledge must be evaluated and measured in the course of a participant's enrollment in a JTPA program:

1. Pre-Employment Competencies, which require the participant to demonstrate the skills and knowledge necessary to identify career objectives, seek and obtain employment and understand job performance.

2. Work Maturity Competencies, which require the participant to demonstrate the ability to apply skills in a training position.

3. Educational Skills Competencies, which require the participant to demonstrate basic computation and communication skills necessary to enter the labor market.

4. Occupational Skills Competencies, which require the participant demonstrate proficiency in those skills necessary to maintain employment in a specific occupation or occupational cluster.

The pre-employment and work maturity competencies have been specifically cross-referenced in this curriculum so that non-renewable natural resource instructors could specify where these competencies are integrated into the curriculum.

Student leadership programs are designed to be an integral part of the curriculum. The competencies are reinforced by student participation in approved student organizations such as Vocational Industrial Clubs of America. The student leadership competencies have been cross-referenced in this handbook to assist the non-renewable natural resource instructor in identifying specifically where these competencies will be taught.

Vocational Industrial Clubs of America (VICA)

Vocational Industrial Clubs of America (VICA) is for students enrolled in secondary and postsecondary vocational courses in trade, industrial, technical and health education.

Through planned club activities, VICA develops the "whole" student, social and leadership abilities as well as vocational skills. The VICA motto is "Preparing for Leadership in the World of Work." VICA goals include:

- Foster an understanding of the functions of labor and management organizations and a recognition of their interdependence.
- Foster respect for the dignity of work.
- Relate school experiences to a young person's search for meaning, identity and achievement.
- Teach young people how to live and work with others...to accept and be accepted.
- Offer activities that complement occupational skill development.

- Create interest in and stimulate favorable community response to trade, industrial, technical and health occupations education.
- Promote high standards in work ethics, craftsmanship, scholarship, and safety.
- Help students understand their roles in a technological society.

Alaska VICA, chartered in 1973, serves about 140 members in 10 chapters. The national organization is located in Leesburg, Virginia.

KEY

M	Math
S	Science
LA	Language Arts
SS	Social Studies
*	Pre-Employment Competencies
+	Student Leadership Competencies

Recommended Competencies by Course Offerings

Competencies

	Competencies	Intro to Non-Renewable Natural Resources/Mining	Intro to Non-Renewable Natural Resources/Gas & Petroleum	Mining	Gas and Petroleum	
	Leadership/Citizenship					
* + LA	Use leadership skills					
* +	Demonstrate initiative and productivity					
* +	Attain work maturity					
* +	Be honest					
* +	Be reliable and dependable					
LA * +	Solve problems					
* +	Be assertive					
* +	Maintain good personal relations					
LA * +	Follow oral and written directions					
* +	Deal effectively with clients					
* +	Evaluate personal traits in relationship to self-employment					
	Employability Skills					
S *	Work safely					
S *	Prevent work-related injuries					
SS *	Follow OSHA guidelines					
S *	Maintain good health for effective job performance					
SS *	Manage personal responsibilities related to employment					
LA SS	Use personal management activities					
LA * SS +	Make career choices					
S + SS	Identify jobs in non-renewable natural resources					
LA * +	Prepare a resume and job application					

Recommended Competencies by Course Offerings

	Competencies	Intro to Non-Renewable Natural Resources/Mining	Intro to Non-Renewable Natural Resources/Gas & Petroleum	Mining	Gas and Petroleum	
LA * +	Write a cover letter					
LA * +	Prepare for an interview					
LA *	Follow up the interview					
* +	Understand employee rights and responsibilities					
LA *	Use proper job resignation procedures					
	<u>Introduction to Non-Renewable Natural Resources</u>					
	I. An overview of non-renewable natural resources					
S	Understand non-renewable natural resources					
S	Understand basic geologic processes					
	II. History					
S SS	Understand the history of mining in Alaska					
SS	Understand social change related to non-renewable natural resource development in Alaska from statehood to present					
	III. Laws, economics, and land ownership					
SS	Understand laws related to Alaska's non-renewable natural resources					
SS	Understand issues related to land ownership and management					
M SS	Understand economics related to non-renewable natural resources					
	IV. Other duties and skills					
LA M SS	Maintain records related to fuel and non-fuel non-renewable natural resource extraction					
	<u>Gas and Petroleum</u>					
	I. Work with the Resource					
S	Obtain basic first aid certification					
S SS	Follow safety regulations					

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Recommended Competencies by Course Offerings

	Competencies	Intro to Non-Renewable Natural Resources/Mining	Intro to Non-Renewable Natural Resources/Gas & Petroleum	Mining	Gas and Petroleum	
	II. Use the Resource					
	A. Retrieving the Resource					
S	Understand petroleum drilling techniques					
S	Understand petroleum production techniques					
S	Perform roustabout work					
S	Perform work as a roughneck					
S	Perform work as a derrick worker					
S	Work as a driller					
S	Perform production operator work					
S M	Perform instrument technician work					
S M	Perform heavy equipment operator work					
	B. Transporting the Resource					
S SS	Analyze petroleum transportation methods					
	C. Processing the Resource					
S	Understand petrochemical refining and manufacturing processes					
	D. Utilizing and Maintaining Equipment					
S	Use hand and power tools					
S	Use pneumatic tools					
S	Weld metal					
LA S	Operate hand-held radios					
LA S	Operate a computer					
	III. Manage and Protect the Resource					

Recommended Competencies by Course Offerings

Competencies

	Competencies	Intro to Non-Renewable Natural Resources/Mining	Intro to Non-Renewable Natural Resources/Gas & Petroleum	Mining	Gas and Petroleum	
S SS	Observe rules related to environmental protection					
S	Clean up (abate) oil spills					
LA	Maintain facilities security					
	IV. Define the Resource					
S SS	Locate potential petroleum deposits in Alaska					
S	Understand how oil is formed					
	V. Identify the Importance of the Resource					
S SS	Understand the history of oil exploration					
SS	Understand the use of petroleum products					
S	Understand the petroleum manufacturing process					
S SS	Understand alternative fuel development					
SS	Analyze the importance of oil to Alaska's economy					
S SS	Market oil products					
	VI. Identify competing uses					
S SS	Understand land-use issues related to petroleum exploration and extraction in Alaska					
S SS	Understand environmental impacts of energy extraction					
SS	Understand the role of organizations and agencies involved with gas and petroleum development					
	Mining					
	I. Work with the Resource					
S	Obtain first aid certification					
S SS	Use safe working practices					
	A. Understand mining techniques					

Recommended Competencies by Course Offerings

Competencies

	Competencies	Intro to Non-Renewable Natural Resources/Mining	Intro to Non-Renewable Natural Resources/Gas & Petroleum	Mining	Gas and Petroleum	
S M	Use mineral location and extraction techniques					
S	Understand metal production					
S	Operate drilling equipment					
M	Lay track					
	B. Use and maintain tools related to mining					
S	Use hand and power tools					
S	Use mine maintenance tools					
S	Timber					
	C. Use and maintain equipment related to mining					
S	Maintain mine machinery					
S	Use heavy equipment					
S	Use underground machinery					
LA S	Handle explosives					
	D. Placer mine					
S	Develop a placer mine					
	E. Subsurface mine					
S	Perform underground mine work					
	F. Surface mine					
S	Work in a surface mine					
S	Use heavy equipment					
S	Drive a haul truck					
	G. Marine Mine					

Recommended Competencies by Course Offerings

Competencies

	Competencies	Intro to Non-Renewable Natural Resources/Mining	Intro to Non-Renewable Natural Resources/Gas & Petroleum	Mining	Gas and Petroleum	
S SS	Perform marine mine work					
	H. Operate tourist mine site					
S SS	Maintain a rock collection					
LA M S SS	Manage a tourist attraction					
S	Operate a small suction dredge					
	I. Process minerals					
S	Understand mineral processing					
	III. Manage and Protect the Resource					
S SS	Understand regulations related to mining					
M S SS	Monitor mine site					
S SS	Reclaim mine site					
	IV. Define the Resource					
S	Understand basic geology					
S	Understand geological theories					
S	Understand the important mineral resources in Alaska					
S SS	Understand features of Alaska's geology					
LA M S	Use field tools					
	V. Identify the Importance of the Resource					
S SS	Understand mining issues in Alaska					
	VI. Identify competing uses					
S SS	Understand environmental and social concerns related to mining					
SS	Understand the role of agencies and organizations involved with mining					

VI
Sample Skills Card

Sample Skills Card

This section of the guide provides teachers with an example of an instrument for evaluating the effectiveness of instruction. The skills record allows teachers to assess competency at four levels of proficiency. Teachers are encouraged to construct their own skills performance record using the competency lists in the curriculum section of this guide.

Instructions for Use

The list of vocational skills/traits was developed from a task analysis of a non-renewable natural resource competency.

Level	Code Key
1	Introductory Level: Can do simple parts of task. Needs to be told/shown how to do most of the task. Needs extremely close supervision.
2	Minimum Level: Can do most parts of the task. Needs help only with most difficult parts. Needs close supervision.
3	Average Level: Can do all parts of task. Needs only spot-check of completed work. Meets local demands for speed and accuracy. Needs moderate job entry supervision.
4	Proficiency Level: Can complete task quickly and accurately. Can direct others in how to do the task. Needs little supervision.

Directions: The instructor/employer may write, date and initial in appropriate square.

Maintain facilities security

	1	2	3	4
Check doors and fences				
Identify unfamiliar people and situations				
Identify and report facility safety hazards				
Check required permits				

Comments:

VII
Suggested Resources

Suggested Resources

This section identifies specific resources and sources for finding instructional materials and supplies for non-renewable natural resources.

The following source lists have been characterized by media type to facilitate teacher use: resource libraries, publishers of texts and instructional materials, state resources, associations, special books/pamphlets, media, and materials suppliers. The following sections are broken into specific gas and petroleum and mining resources.

The first part of both the gas and petroleum and mining resource sections identifies companies and organizations for each of the areas. The second part suggests resources and films for those areas.

The Alaska Department of Education has not formally reviewed nor approved all the resources listed in this section. Teachers are encouraged to preview materials before using them in the classroom and/or personally contact teachers of similar disciplines for recommendations regarding resources.

Resource Libraries

Alaska Vocational Materials Library
Office of Adult and Vocational Education
Alaska State Department of Education
Box F
Juneau, AK 99811
(907) 465-2980

- Alaska Energy Education Series
- Appropriate Technology for Alaskans
- Basic Skills For The Trades
- Building in the North
- Choices & Challenges: A Young Man's and Teen Woman's Journal for Self-Awareness and Personal Planning
- Cooperative Education and On-The-Job Training Handbook
- Home-Based Business Resources
- Industrial Education Curriculum
- Industrial Education Resources
- Local Advisory Committee: Handbook for Vocational Administrators
- Pre-Employment Competencies Resource Guide
- Renewable Natural Resources/Agriculture Curriculum
- Safety and School Shop Planning
- STARS: Secondary Training For Alaska
- Vocational Education Administration Handbook

The Library maintains curricula for all vocational areas. Resources are loaned for a 2 month review period. There are also many materials which may be purchased from the Library's special collections. Some materials are available free of charge.

The Library's catalog is computerized and may be operated on an Apple Computer using Appleworks Software. The catalog may be obtained by sending five blank disks for duplication or upon request.

Alaska Career Information System
Office of Adult and Vocational Education
Alaska Department of Education
Box F
Juneau, AK 99811
(907) 465-2980

- Comprehensive career guidance system developed by Alaskans and for Alaskans seeking occupational and educational opportunities in and out of Alaska.

Alaska Energy Library
Alaska Department of Community and Regional Affairs
949 E. 36th Street, Suite 403
Anchorage, AK 99508

- References, maps, greenhouse construction and other energy-related materials

Alaska Health Sciences Library
3211 Providence Drive
Anchorage, AK 99508

- Journals and magazines in the area of job safety and health

Alaska Resources Library
U.S. Department of Interior
Bureau of Land Management
701 C Street
Box 36
Anchorage, AK 99513
(907) 271-5025

- Information center to assist in serious research involving natural resources in Alaska. Provides computer searches and interlibrary.

Alaska State Film Library
650 W. International Airport Road
Anchorage, AK 99518
(907) 561-1132

- Videos on ANSCA: "Common Ground", "Losing Ground", "The Struggle", "ANCSA Plain and Simple", "Beyond the Bottom Line", "ANCSA-Land at Risk"

Anchorage Center
for Economic Education
School of Business and Public Affairs
University of Alaska
Anchorage, AK 99508
(907) 786-1770

- Lending library of films and filmstrips: "The Big E's, The Climber, More Economics and The Global Society, The Economics of Energy, Economics and The Environment, The Economics of Public Utility Enterprise, The Economics of Pollution, The Economics of the Energy Problem, and The Economics of Oceans"

Biomedical Library
901 Koyukuk Avenue South
Fairbanks, AK 99701

- Books on job health hazards and hazardous materials

National Center for Research in
Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, OH 43210

- Vocational Education Curriculum Materials database of all 50 states.

Northwestern Vocational Curriculum
Coordination Center
St. Martin's College
Lacey, WA 98503

- 10-State regional library of vocational materials. Can be accessed through the Alaska Vocational Materials Library.

Publishers

Alaskabooks
P.O. Box 1494
Juneau, AK 99802
(907) 586-3067

Hobar Publications
1234 Tiller Lane
St. Paul, MN 55112
Excellent Source
Also good curriculum/instructional materials, tools and supplies.

Alaska Fieldbooks Co., Ltd.
P.O. Box 1044
Anchorage, AK 99510

American Technical Publishers
1155 W. 175th St.
Homewood, IL 60430

Business Publishers, Inc.
951 Pershing Dr.
Silver Spring, MD 20910-4464

Ken Cook Company
9929 West Silver Spring Road
Milwaukee, WI 53225
(414) 466-6060

Delmar Publishers
2 Computer Dr. West
Albany, NY 12212
Excellent Textbooks

Fairmont Press, Inc.
700 Indian Trail
Liburn, GA 30247
(404) 925-9388

Glencoe Publishing Co.
Bennett and McKnight Division
15319 Chatsworth Street
Mission Hills, CA 91345
(312) 381-1840

Gregg Division/McGraw-Hill Book Co.
Western Regional Office
8171 Redwood Hwy
Novato, CA 94947
(415) 897-5293

Harper and Row Publishers, Inc.
10 East 53rd Street
New York, NY 10022
(212) 207-7099

Houghton Mifflin Publishing Co.
777 California Ave.
Palo Alto, CA 94304

National Textbook Company
4255 W. Touhy Ave.
Lincolnwood, IL 60646-1975

Prakken Publications, Inc.
P.O. Box 8623
Ann Arbor, MI 46107
(313) 769-1211

Prentice-Hall Publishing Co.
Box 1050
Mt. Kisco, NY 10549

South-Western Publishing Co.
5101 Madison Road
Cincinnati, OH 45227

Technical Publishing
1301 South Grove Ave.
P.O. Box 1030
Barrington, IL 60010

VGM Career Books
Division of National Textbook Co.
4255 West Touhy Ave.
Lincolnwood, IL 60646

John Wiley and Sons, Inc
605 Third Ave.
New York, NY 10016

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

State Resources

Alaska Department of Environmental Conservation
P.O. Box O
Juneau, AK 99811
(907) 465-2600/Pub. Information
(907) 465-2621/Library

- Materials on pollution, oil spills, hazardous waste regulations for specific pollution type problems
- Provides information on the handling, transportation and disposal of hazardous waste materials

Alaska Department of Labor Occupational Safety and Health Section P.O. Box 7-022 Anchorage, AK 99501	• Provides free information, training, and inspections
California Polytechnic State University Vocational Education Productions San Luis Obispo, California 93407	• Natural Resource Curriculum Guidelines
Mid-America Vocational Curriculum Center 1500 W Seventh Ave Stillwater, OK 74074-4364 (405) 377-2000	• Basic Surveying Technology • Hydraulics • Introduction to Instrumentation • Oxyacetylene Welding and Cutting • Small Engines and Diesel Mechanics Series
Minnesota Instructional Materials Center 3554 White Bear Ave. White Bear Lake, MN 55110 (616) 770-3943	• Natural Resource Management
Oregon Career Development Consortium Marion Education Service District 651 High St. NE, Suite 4 Salem, OR 97301	• Basic Skills in Vocational Education: Computer Skills, Mathematics, Reading, Speaking/Listening and Writing
Rhode Island Department of Elementary and Secondary Education 22 Hayes Street Providence, RI 02908	• Natural Resource Curriculum Guide
Vocational Studies Center University of Wisconsin-Madison 964 Educational Sciences Bldg. 1025 W Johnson St. Madison, WI 53706	• Tools, Equipment and Machinery: Adapted for Vocational Education and the Employment of Handicapped People

Associations

Alaska Natural Resource and Outdoor Education Association (ANROE) Box 110536 Anchorage, AK 99511-0536	• Provides networking for natural resources educators, disseminates curriculum trains teachers in curriculum use, and provides an information clearinghouse
The Alaska Federation of Natives (AFN) 411 West Fourth Ave., Suite 301 Anchorage, AK 99501	• Information on Native land claims
The Alaska Native Foundation P.O. Box 100278 Anchorage, AK 99501	• Information on Native land claims • Alaska Native Land Claims, by Robert Arnold • Workbook for Alaska Native Land Claims • To Have and to Hold Land Resources • Trouble Ahead

American Vocational Association
1410 King St.
Alexandria, VA 22314

- Resources for vocational instructors

Special Books/Pamphlets

Alaska Geographic Society
Box 4-EEE
Anchorage, AK 99509

- Alaska's Oil Industry

Alaska Public Lands Information Center
250 Cushman Street, Suite 1A
Fairbanks, AK 99701

- Information on federal lands

Arctic Environmental Information
and Data Ctr. (A.E.I.D.C.)
707 A St.
Anchorage, AK 99501

- Films and environmental studies

Alaska Center for the Environment
700 H St. #4
Anchorage, AK 99501

- Environmental group. Deals with hazardous wastes.

Alaska, University of—Fairbanks
School of Agriculture-Land Resources
Management
301 O'Neill Resources Building
Fairbanks, AK 99775-0100
Available thru:
UAF library (and probably other libraries
around the state)
Also:
Alaska Native Education
P.O. Box 1250
Fairbanks, AK 99707

- Natural Resources Management
  Includes units on:
  Regional Corporations
  Maps: Tools of Resource Managers
  Water Resources
  Energy Resources
  A self-paced introduction for Alaska native students focusing on regional corporation responsibilities

Bureau of Land Management
U.S. Department of Interior
701 C Street
Box 13
Anchorage, AK 99513

- Manages public land

The Conservation Foundation
1255 Twenty-Third Street, NW
Washington, DC 20037

- National conservation organization

Freeman and Co., W.H.
660 Market St.
San Francisco, CA 94104

- Resources and Man, 1969

National Park Service
2525 Gambell St.
Anchorage, AK 99503

- Films on national parks

NUS Training Corporation
A Halliburton Company
Gaithersburg, MD

- Plant Science, Operations Training Program: Basic Theory and Systems

U.S. Army Corps of Engineers
Alaska District
P.O. Box 898
Anchorage, AK 99506-0898
(907) 753-2712
(800) 478-2712

- "Development in Alaska's Waterways and Wetlands"
- "Water Resources Development in Alaska"

U.S. Environmental Protection Agency
Washington, D.C. 20460

- Information related to mining and petroleum on hazardous wastes, air pollution, and clean water regulations, and on-the-job hazards

University Publishers Inc.
239 Park Avenue South
New York, NY 10003

- The Land Resources of Alaska, by Johnson, Hugh A. & Jorgenson, Hugh A

Media

American Association for Vocational Instructional Materials (AAVIM)
120 Driftmeir Engineering Center
Athens, GA 30602

Career Aids, Inc.
20417 Nordhoff St.
Chatsworth, CA 91311

Instructional Materials Service
Cornell University, 24 Roberts Hall
Ithaca, NY 14853-5901

Modern Talking Picture Service, Inc.
5000 Park St. N
St. Petersburg , FL 33709
Outstanding source of films,
Free Loan Service

National Archives and Records Administration
National Audiovisual Center
8700 Edgeworth Dr.
Capitol Heights, MD 20743-3701

National Innovative Media Co.
Route #2, Box 301 B
Calhoun, KY 42327

Pictures, Inc.
811 W. 8th Ave.
Anchorage, AK 99502-3495
(907)279-1515

Prentice-Hall Media
150 White Plains Rd
Tarrytown, NY 10591

Simulators, Inc.
1366-70 Ruan St.
Philadelphia, PA 19124

Teaching Aids, Inc.
P.O. Box 1798
Costa Mesa, CA 92628-0798

Venard Films, Ltd.
Box 1332
Peoria, IL 61654

Vocational Education Media Center
10 Tillman Hall
Clemson University
Clemson, SC 29631

Vocational Education Productions
Cal Poly State University
San Luis Obispo, CA 93407

Materials Suppliers

Technovate, Inc.
P.O. Box 1499
Burnsville, MN 55337

Scavengers Science Education Supplies
P.O. Box 211328
Auke Bay, AK 99802

Northern Hydraulics, Inc.
910 SW 12th Ave
Pompano Beach, FL 33060

Turner Equipment Co., Inc.
Hwy 117 South
Goldsboro, NC 27530

Gas and Petroleum Companies and Organizations

Alaska Conservation Foundation
340 G Street #201
Anchorage, AK 99501

Alaska Environmental Lobby, Inc.
204 N. Franklin, Suite 3
Juneau, AK 99801

Alaska Oil and Gas Association
121 W. Fireweed Lane, Suite 207
Anchorage, AK 99503-2035
(907)272-1481

Alaska Vocational Technical Center
Box 889
Seward, AK 99664

Alyeska Pipeline Service Company
1835 South Bragaw St.
Anchorage, AK 99512

American Petroleum Institute
1220 L Street NW
Washington, DC 20005

ARCO Alaska
P.O. Box 100360
Anchorage, AK 99510
(907)276-1215

Association of Desk and Derrick Clubs
411 Thompson Building
Tulsa, OK 74103

Energy Source Education Council
Program Distribution Office
5505 East Carson St., Suite 250
Lakewood, CA 90713

Exxon Oil Company
3301 C St.
Anchorage, AK 99510

Halliburton Energy Institute
Drawer 1431
Duncan, OK 73536

Howell Training Company
5201 Langfield Road
Houston, TX 77040-6694

McGraw-Hill Training Systems
P.O. Box 641
Del Mar, CA 92014-9980

Mining & Petroleum Training Service
155 Smith Way
Soldotna, AK 99669
(907) 262-2788

The National Center for Appropriate Technology
Box 3838
Butte, MT 59701

NSU Training Corporation
910 Clopper Road
Gaithersburg, MD 20878-6694

Rike Services Inc.
P.O. Box 13786
New Orleans, LA 70185-3786

Sierra Club
Alaska Chapter
P.O. Box 103441
Anchorage, AK 99510-3441

Sohio
A Company of Standard Oil
101 Prospect Avenue
Cleveland, OH 44115

Gas and Petroleum Resources

Suggested Reading

Alaska Department of Education
Office of Adult and Vocational Education
Vocational Materials Library
P.O. Box F
Juneau, AK 99811
(907)465-2980

- Alaska Energy Education Series

Alaska Department of Education
Office of Basic Education
P.O. Box F
Juneau, AK 99811
(907)465-2841
or Engelhard Industries
301 W. Northern Lights Blvd., Suite #101
Anchorage, AK 99503
(907)274-2211

- Alaska Resources Kit: Minerals

Alyeska Pipeline Service Company
1835 South Bragaw Street
Anchorage, AK 99512

- "Operating the Trans Alaska Pipeline"

The American Petroleum Institute
1220 L Street, NW
Washington, DC 20005

- Facts about Oil
- Primer in Oil and Gas Production, 3rd ed., 1971

Gulf Publishing Co.
PO Box 2608
Houston, TX 77252

- A Primer in Drilling & Production Equipment, Lynch, P.F., 1980: *Volume 1: The Powertrain; Volume 2: Rig Equipment; Volume 3: Downhole Operations*
- History of Oil Well Drilling
  Brantly, J.E., 1971
- Introduction to Petroleum Production, Skinner, D.R.,1981. *Volume 1: Reservoir Engineering, Drilling, Well Completions; Volume 2: Fluid Flow, Artificial Lift, Gathering Systems, and Processing; Volume 3: Well Site Facilities: Water Handling, Storage, Instrumentation, and Control Systems*
- Oil from Prospect to Pipeline, 4th Edition, Wheeler, R. R. and Whited, M., 1981

Petroleum Extension Service
University of Texas at Austin
10100 Burnet Road, BRC-2
Austin, TX 78758
(512)835-3163

- Fundamentals of Petroleum (Second Edition), 1981

The Petroleum Publishing Company
Box 1260
Tulsa, OK 74101

- A Handbook of Oil Industry Terms and Phrases
  Langenkamp, R.D.
- Modern Petroleum, A Basic Primer of the Industry, Berger, B.D. and Anderson, K.E., 1978

Films

American Petroleum Institute
Production Department
Attn: Training Administrator
211 North Ervay, Suite 1700
Dallas, TX 75201
(214)741-6791

- Write for list of films

Coronet, the Multimedia Company
Division of Simon and Schuster Communications
108 Wilmot Road
field, Il 60015
(800)621-2131

- *Oil, from Fossil to Flame.*
  16mm color, 13 minutes, 1976. Gr. 3-up. Shows how oil was formed, traces Deer- history of petroleum industry and identifies major proven reserves of oil throughout the world.

Modern Talking Picture Service
5000 Park Street North
St. Petersburg, FL 33709
541-5763

- *Pipeline, A Pipeline...And Animals!, The Permafrost Frontier*
  three films concerning the Alaska oil (813) industry Alyeska Pipeline Service Company, free.

Shell Oil Company Film Library
Scheduling Center
5000 Park Street North
St. Petersburg, FL 44709
(813)541-5763

- Write for list of films

The Standard Oil Company (Ohio)
Film Library
c/o Cinecraft
2515 Franklin Boulevard
Cleveland, OH 44113
(216)621-2655

- Write for list of films

Mining Companies

Alaska Gold Co.
P.O. Box 6403000
Nome, AK 99762
(907)789-4171

Anvil Mining Inc.
Alaska Gold Co.
General Delivery
Nome, AK 99762

Battle Mountain Gold Co.
600 W. 58th Ave., Unit J
Anchorage, AK 99518-8585
Geologist: Bill Ellis
(907)563-0755 or
(907)789-0834

Citigold Alaska Inc.
P.O. Box 75210
Fairbanks, AK 99707-5210
John Sprague
(907)456-1241

Diamond Shamrock Corp.
717 North Harwood Street
Dallas, TX 75201

Echo Bay Mines
4404 Thane Rd.
Juneau, AK 99801
Project Engineer: John Babcock
(907)586-4161

Engelhard West, Inc.
301 W. Northern Lights Blvd., Suite 101
Anchorage, AK 99503
(907)274-2211
Alaska Operations Manager: John Blackwell

Fairbanks Exploration Inc.
P.O. Box 82549
Fairbanks, AK 99708
(907) 479-7547
President: Curtis Freeman

Golden Sitka Resources
9th Floor, 850 W. Hastings St.
Vancouver, BC V6C 1E1 Canada
(604) 684-1092

Greens Creek Mining Company
Vintage Blvd., Suite 200
Juneau, AK 99803
(907)789-4171

Hawley Resource Group
941 E. Dowling Road
Anchorage, AK
President: Chuck Hawley
(907)562-4673

Kensington Mine
Old Dairy Rd., Suite 102
Juneau, AK 99801

Placer Dome
California Building, Suite 2500
San Francisco, CA 94111-5472
Chief Geologist: Banno Pastch
(415) 986-0740

Nerco Minerals/Resource
Associates of Alaska
International Way
Fairbanks, AK 99701
Geologist: Wally Toupe

Tri-Con Mining Inc.
P.O. Box 2357
Fairbanks, AK 99701
Mine Manager: Ed Armstrong
(907)479-4686

Usibelli Coal Mine, Inc.
P.O. Box 1000
Healy, AK 99743
Charles B oddy
(907)683-2226

U.S. Borax
P.O. Box 5320
Ketchikan, AK 99901
Don Finney

Valdez Creek Mining Co., Inc.
6421 Winchester
Anchorage, AK 99507

Westgold
P.O. Box 1210
Nome, AK 99762
General Manager: Bob Prescott
(907)443-2252

Windfall Gold Mining Corp.
P.O. Box 1920
Nome AK 99762
General Manager: Frank Saunders
(907)443-5888

Mining Organizations

Alaska Lapidary Society
3008 West 29th Street
Anchorage, AK 99503

Alaska Miners Association, Inc.
Rich Hughes, Statewide President
Curt McVee, Executive Director
Statewide Office
501 West Northern Lights Blvd., Suite 203
Anchorage, AK 99503
(907) 274-7522
Kenai Branch
Dennis Steffy, Chairman
C/O Mining & Petroleum Training Service (MPTS)
155 Smith Way, Suite 104
Soldotna, AK 99669
(907) 262-2788
Nome Branch
Joe Fischer, President
P.O. Box 242
Nome, AK 99762
(907) 443-2586
Anchorage Branch
Norm Lutz, Chairman
501 West Northern Lights Blvd., Suite 203
Anchorage, AK 99503
(907) 274-6473
Fairbanks Branch
Roger Burggrof, Chairman
P.O. Box 73069
Fairbanks, AK 99707
(907) 451-6650
Juneau Branch
John Mulligan, Chairman
P.O. Box 1684
Juneau, AK 99802
(907) 364-3144

Alaska Women in Mining
P.O. Box 83743
Fairbanks, AK 99701

American Institute
of Professional Geologists
7828 Vance Dr., Suite 103
Arvada, CO 80003
Bill Slater, President
Alaska Section
Pouch 6900
Anchorage, AK 99502
(907) 338-4200

The Chugach Gem & Mineral Society
P.O. Box 4-2027
Anchorage, AK 99503

Circle Mining and Recording District
General Delivery
Central, AK 99730
Susan Knapman, President

Fairbanks Mining District
Fairbanks, AK 99701
Don Stein, President

Forty-Mile Miners Association
David Kukowski, President
General Delivery
Chicken, AK 99732

Juneau Mining District
Roger Eichman, President
P.O. Box 020765
Juneau, AK 99802

Kantishna Mining District
Sam Koppenburg, President
SRD Box 9070
Palmer, AK 99645

Koyukuk Mining District
Coldfoot, AK 99705

Livengood-Tolovana Mining District
Rose Rybachek, President
P.O. Box 73069
Fairbanks, AK 99707

Mineral Information Institute
6565 South Dayton, Suite 3800
Englewood, CO 80111

Miners Advocacy Council
Josh Moore, President
P.O. Box 83909
College, AK 99708
(907) 452-6227

Miners Rights Action Group
Ken Manning
P.O. Box 80325
College, AK 99708
(907) 479-4890

Northwest Mining Association
414 Peyton Bldg.
Spokane, WA 99201
(509) 624-1158

Resource Development
Council for Alaska, Inc.
807 G Street, Suite 200
P.O. Box 100516 (mailing)
Anchorage, AK 99510-0516
(907) 276-0700

Mining and Metallurgical
Society of America
275 Madison Ave.
New York, NY 10016

Placer Miners of Alaska
P.O. Box 73756
Fairbanks, AK 99707

Seward Mineralogical Society
Seward, AK 99664

Seward Mining District
Tom Williams, President
Box 66
Hope, AK 99605

Society of Mining Engineers (SME)
Caller No. D
Littleton, CO 80162-5002
(303) 973-9550

Society of Mining Engineers
Alaska Section
Milton A. Wiltse, Chairman
794 University Ave., Basement
Fairbanks, AK 99709
(907)474-7147
Southern Alaska Branch
Charles Drummond, Chairman
2525 Gambell Street, Rm. 107
Anchorage, AK 99503
(907) 271-4213

Western Mining Council
Kenai Peninsula Chapter
Oscar H. Bailey, President
Old Nash Road
Seward, AK 99664
(907) 224-5963

Valdez Mining District
Claud Morris, President
P.O. Box 547
Girdwood, AK 99581

Yentna Mining District
John Jacobsen, President
700 Ash Pl.
Anchorage, AK 99501

Federal Agencies

Alaska Public Lands Information Center
250 Cushman Street, Suite 1A
Fairbanks, AK 99701
(907) 451-7352
Manager-Deanne Adams
Assistant Manager-Chuck Lennox

Bureau of Land Management (BLM)
Alaska State Office
701 C Street
P.O. Box 13 (mailing)
Anchorage, AK 99513
State Director-Michael Penfold
Public Room-(907)271-5960
Fairbanks Support Center and Land Information Office (primary contact for information on Interior and Northern Regions)
1541 Gaffney Street
Fairbanks, AK 99703
(907)356-5345
Support Center Manager-James Murray
Information Operator-(907)356-2025

Arctic District Office
1541 Gaffney Street
Fairbanks, AK 99703
(907)356-5132
District Manager-Thomas Dean
Anchorage District Office
6881 Abbott Loop
Anchorage, AK 99507
(907)267-1200
District Manager-John Rumps
Glennallen District Office
1541 Gaffney Street (mailing)
Fairbanks, AK 99703
(907)822-3218
District Manager-Gene Terland

National Park Service (NPS)
Alaska Regional Office
2525 Gambell Street
Anchorage, Alaska 99503
(907) 271-2643
Regional Manager-Boyd Evison
Mining Engineer-Lynn S. Griffiths

Mine Safety and Health Administration
(MSHA)
117 1000 7th Ave. NE., Rm. 100
Bellevue, WA 98004
(206) 442-70037
Western District, Subdistrict Manager-
Martin Rosta

Mine Safety and Health Administration
(MSHA)
Coal Mine Safety and Health, District 9
P.O. Box 25367, DFC
Denver, CO 80225-0367
(303) 236-2740
District Manager-John W. Barton

U.S. Army Corps of Engineers
Department of the Army
Regulatory Branch
P.O. Box 898
Anchorage, AK 99506-0898
District Engineer-
Colonel William T. Gregory, Jr.
Write: Attention: NPACO-R-S, or
Call: Tom Skordal (907) 753-2724 or
(800) 478-2712 (in Alaska only)

U.S. Bureau of Mines
Alaska Field Operations Center
201 East 9th Ave., Suite 101
Anchorage, AK 99501
(907) 271-2455
Chief-Donald P. Blasko
Anchorage Supervisor-
Robert Hoekzema
Juneau Field Office
P.O. Box 020550
Juneau, AK 99802-0550
(907) 364-2111
Assistant Chief-David Carnes
State Mineral Officer-Tom Pittman
Fairbanks Field Office
206 O'Neill Resource Bldg.
905 Koyukuk Ave. North
University of Alaska
Fairbanks, AK 99775-5140
(907) 479-4277
Physical Scientist-Jim Barker

U.S. Environmental
Protection Agency (EPA)
Alaska Operations Office
701 C Street
Box 19 (mailing)
Anchorage, AK 99513
(907) 271-5083
Assistant Regional Administrator-
Alvin L. Ewing
Regional Headquarters
Seattle, WA 98101
(206) 442-1200
Regional Administrator-Robbie Russell
Alaska Operations Office
3200 Hospital Drive, Suite 101
Juneau, AK 99801
(907) 586-7619
Attn: Steven Torok

U.S. Forest Service (USFS)
Regional Office
Federal Bldg.
P.O. Box 021628 (mailing)
Juneau, AK 99802-1628
(907) 586-7847
Regional Forester-Michael A. Barton

U.S. Geological Survey (USGS)
4230 University Dr.
Anchorage, AK 99508
(907) 271-4138
Chief, Branch of Alaskan Geology-
Donald L. Grybeck
Alaska Distribution Center (for
maps and brochures)
Federal Bldg.
101 12th Ave.
Fairbanks, AK 99701
(907) 456-0244
Public Inquiries Office (for Alaska Section
information and publications)
4230 University Drive, Rm. 101
Anchorage, AK 99508
(907) 561-5555

State Agencies

Applied Mining Technology Program
Tanana Valley College
4280 Geist Rd.
Fairbanks, AK 99709
Coordinator: P. Jeffery Burton

Department of Commerce and Economic Development (DCED)
State Office Building, 9th Floor
P.O. Box D (mailing)
Juneau, AK 99811
(907) 465-2500
Commissioner-J. Anthony Smith

Department of Environmental Conservation (DEC)
3220 Hospital Drive
P.O. Box O (mailing)
Juneau, AK 99811-1800
(907)465-2600
Public Information (907) 465-2606
Commissioner-Dennis D. Kelso

Division of Business Development
State Office Building, 9th Floor
P.O. Box D (mailing)
Juneau, AK 99811
(907)465-2094
Development Specialist-Thyes Shaub

Division of Minerals and Forest Products
1001 Noble Street, Suite 420
Fairbanks, AK 99701
(907)452-7464
Minerals Specialist–Charles B. Green
Ask for Alaska's Oil/Gas and Minerals Industry publications, especially back issue Vol. 9, No. 4, 1982.

Department of Fish and Game (ADF&G)
Capital Office Park
P.O. Box 3-2000 (mailing)
Juneau, AK 99802
(907)465-4100
Commissioner-Don W. Collinsworth
(907)465-4105
Acting Director, Habitat Division-
Bruce Baker
Southeastern Regional Office
Habitat Division
803 3rd Street, 1st Floor
P.O. Box 20 (mailing)
Douglas, AK 99824

Department of Fish and Game
Southcentral Regional Office
Habitat Division
333 Rasberry Road
Anchorage, AK 99518-1599
(907)267-2283
Central Regional Office
Habitat Division
1300 College Road
Fairbanks, AK 99701
(907)451-6192

Department of Natural Resources (DNR)
400 Willoughby Center, 5th Floor
Juneau, AK 99801
(907)465-2400
Commissioner-Judith M. Brady
Deputy Commissioner-Lennie Boston-Gorsuch
Division of Forestry
3601 C Street, Frontier Bldg., 13th Floor
P.O. Box 7005 (mailing)
Anchorage, AK 99510
(907)762-4482
Northcentral District
3726 Airport Way
Fairbanks, AK 99701
(907)479-2243
Regional Forester-Lester Fortune
Southcentral District
Division of Forestry
3601 C Street, Frontier Bldg., 10th Floor
P.O. Box 7005 (mailing)
Anchorage, AK 99510
(907)762-2117
Regional Forester-Joseph Wehrman
Southeastern Regional Office
Division of Forestry
400 Willoughby Center, 5th Floor
Juneau, AK 99801
(907)465-2491
Division Liaison-Jim McAllister

Department of Natural Resources (DNR)
Division of Geological
and Geophysical Surveys (DGGS)
794 University Ave., 2nd Floor
Fairbanks, AK 99709
(907)474-7147
State Geologist: Robert B. Forbes
(907)479-7625
Deputy State Geologist (Acting):
Wyatt G. Gilbert
(907)465-4290

Eagle River Office
Department of Natural Resources (DNR)
Division of Geological and Geophysical Surveys
P.O. Box 772116 (mailing)
Fish Hatchery Road
Eagle River, AK 99577
(907)696-0070
Juneau Office
Department of Natural Resources (DNR)
Division of Geological and Geophysical Surveys
400 Willoughby Center, 3rd Floor
Juneau, AK 99801
(907)465-2533

Department of Natural Resources (DNR)
Division of Land and Water Management
3601 C Street, Frontier Bldg.
P.O. Box 7005 (mailing)
Anchorage, AK 99510
(907)762-4355
Department of Natural Resources (DNR)
Division of Land and Water Management
Northern Regional Office
4420 Airport Way
Fairbanks, AK 99709
(907)479-2243
Regional Manager-Jerry Brossia
Southcentral Regional Office
Department of Natural Resources (DNR)
Division of Land and Water Management
3601 C Street, Frontier Bldg.
P.O. Box 7005 (mailing)
Anchorage, AK 99510
(907)762-2251
Regional Manager-Margaret J. Hayes
Southeastern Regional Office
Department of Natural Resources (DNR)
Division of Land and Water Management
400 Willoughby Center, 4th Floor
Juneau, AK 99801
(907)465-3400
Regional Manager-Paula T. Burgess

Department of Natural Resources (DNR)
Division of Mining
3601 C Street, Suite 800
P.O. Box 107016
Anchorage, AK 99510-7016
(907)762-2160
Director-Gerald L. Gallagher

Department of Natural Resources (DNR)
Division of Mining (DOM)
Fairbanks Office
4420 Airport Way
Fairbanks, AK 99709
(907)479-2243
Regional Manager: Judd Peterson
Department of Natural Resources (DNR)
Division of Mining (DOM)
Juneau Office
400 Willoughby Ave., 4th Floor
Juneau, AK 99801
(907)465-2478
Geologist: Frances Pillifant

Mineral Industry Research Laboratory (MIRL)
210 O'Neill Resources Bldg.
(907)474-7135 or 7136
Director-Donald J. Cook
Associate Director-P.D. Rao

Mining and Petroleum Training Service
155 Smith Way
Soldotna, AK 99669
(907)262-2788
Director: Dennis Steffy
Anchorage Office
Mining and Petroleum Training Service
4050 Lake Otis Parkway, Suite 100
Anchorage, AK 99508
Office Manager: Dena Bennett
(907)563-8098

University of Alaska, Anchorage
3211 Providence Drive
Anchorage, AK 99508
(907)786-1800

University of Alaska, Fairbanks
College of Natural Sciences
Department of Geology & Geophysics
Brooks Bldg., Rm. 408
(907)474-7565
Department Head-Samuel Swanson

School of Mineral Engineering
Brooks Bldg., Rm. 209
(907)474-7366
Dean-Donald J. Cook
Fairbanks, AK 99775-0760

Mining Resources

Suggested Reading

Alaska Department of Commerce and Economic Development
PO Box D
Juneau, AK 99811

- The Role of Placer Mining in the Alaska Economy, 1983

Alaska Department of Education
Office of Basic Education
P.O. Box F
Juneau, AK 99811
(907)465-2841
or Engelhard Industries
301 W. Northern Lights Blvd., Suite #101
Anchorage, AK 99503
(907) 274-2211

- Alaska Resources Kit: Minerals

Alaska Northwest Publishing Company
Box 4-EEE
Anchorage, AK 99509

- The Alaskan Gold Fields, Sam C. Dunham , 1983, 64p.
- Alaska's Oil/Gas & Minerals Industry, Alaska Geographic, Vol.9, #4, 1982, 216p.
- Chilkoot Pass: The Most Famous Trail in the North, Archie Satterfield, 1977, 105p. 1983 (Revised and Expanded). 213p. Bibliography, Index.
- Gold Hunting in Alaska, Joseph Grinell. Edited by Elizabeth Grinell, 1983, 78p. (Originally published in 1901)
- In Search of Gold: The Alaska Journals of Horace S. Conger 1898-1899, Carol Jean Holeski, & Marlene Conger Holeski. The Alaska Geographic Society, 1983, 313p.
- Nome, "City of the Golden Beaches", Terrence Cole, Chief Editor. Alaska Geographic Series, Vol. II, No. 1, 1984
- Nome Nuggets, L.H. French, M.D., 1983 64p. (Originally published in 1905)
- Thirteen Years of Travel and Exploration in Alaska, W.H. Pierce, Edited by Professor and Mrs. J.H. Carruth, 1977, 105p.

Arizona Mining Association
100 W. Clarendon, Suite 1720
Phoenix, AZ 85013

- Mining, Minerals & Me, J.L. McBiles

Color Press
College Place, WA 99324

- The Founding of Juneau, R.N. DeArmond, 1980, Gastineau Channel Centennial Association, Juneau

Doubleday and Co., Inc
501 Franklin Avenue
Garden City, NY 11530

- Where Are You Going With That Coal?, Roy Doty and Len Moar, 1978, 62 p.

Franklin Watts
Subsidiary of Grolier, Inc.
387 Park Ave. S
New York, NY 10016
(800)672-6672

- Coal, Betsy H. Kraft., 1976, 66p.

J. H. Day Publishing Co.
61 Briarwood
Athens, OH 45701

- Picture Book of Metals, Ania Brooks, 1972

J. Messner
W. Division of Simon and Schuster
200 Old Tappan Road
Old Tappan, NY 07675
(800)223-1360

- Black Sunshine: The Story of Coal, Olive Burt. Julian Messner, 1977, 63 p.

Lothrop, Lee and Shepard
Divison of William Morrow and Co., Inc.
39 Plymouth Street
PO Box 1219
Fairfield, NJ 07007
(800)843-9389

- What Can She Be? A Geologist, Gloria and Esther Goldreich. , 1976, 48p., I.L.: 1-5

McGraw Hill Book Company
Western Regional Office
8171 Redwood Highway
Novato, CA 94947

- Geology for Petroleum Exploration, Drilling and Production, Norman J. Hyne, PhD., 1984

Pergamon Press
Fairview Park
Elmsford, NY 10523

- A Concise History of Mining, Cedric E. Gregory, 1980, 259p.

Petroleum Extension Service
University of Texas at Austin
10100 Burnet Road, BRC-2
Austin, TX 78758
(512)835-3163

- Fundamentals of Petroleum, 1981

Resources for the Future, Inc.
Johns Hopkins University Press
701 W. 40th Street, Suite 275
Baltimore, MD 21211
(301)338-6956

- Minerals and Men, James McDivitt, and Gerald Manners,1974

Time-Life Books, Inc.
Divison of Time, Inc.
Duke Street
Alexandria, VA 22314
(800)621-7026

- The Alaskans, Time-Life Books Editors, with text by Keith Wheeler. 1977, 240p., 777 Bibliography, Index

University of Alaska
Mineral Industry Research Laboratory
School of Mineral Engineering
Brooks Building
Fairbanks, AK 99775

- Boyhood in the Nome Gold Camp, Irving Reed,1968
- Handbook for the Alaskan Prospector, Ernie Wolff, 1964

University of Alaska Press
Signer's Hall
University of Alaska
Fairbanks, AK 99775-1580
(907)474-6389

- Blazing Alaska's Trails, A.H. Brooks, 1973

U.S. Geological Survey
101 12th Avenue, Box 12
New Federal Building
Fairbanks, AK 99701

- Gemstones of the United States, Dorothy M. Schlegel, Bulletin 10-42-G

US Government Printing Office
Washington, DC. 20402

- A Dictionary of Mining, Minerals, and Related Terms, Thrush, Paul W. (Bureau of Mines, Dept. of the Interior)

Vanguard Press, Inc.
424 Madison Ave.
New York, NY 10017
(212)753-3906

- Hard Rock God: The Story of the Great Mines That Were The Heartbeat of Juneau, Brenda and David Stone, 1980, 108p., Glossary, Bibliography, Index

Van Nostrand Reinhold Company
7625 Empire Drive
Florence, KY 41042

- Encyclopaedia of Minerals, Willard Lincoln Roberts, 1974

W.H. Freeman and Company
660 Market Street
San Francisco, CA 94104

- Stones. Their collection, identification and uses, R.V. Dietrich, 1980

Films

AMAX Inc.
PO Box 1700
Greenwich, CO 06836
(203)629-6000

- *Mining and the Environment*
  16 mm, 13 minutes, 1976. All age levels. Shows how AMAX Inc., the nation's third largest coal company, develops productive farms, grazing lands, parks and wildlife preserves after surface mining operations in the Midwest and West.

Britannica Films, Inc.
425 North Michigan Ave.
Chicago, IL 60611
(800)558-6968

- *Minerals & Rocks (Stones of the Earth)*
  16mm film, 16 minutes.

Coronet, the Multimedia Company
Division of Simon and Schuster Communications
108 Wilmot Road
Deerfield, Il 60015
(800)621-2131

- *Our Changing Earth*
  1974. 6 color sound filmstrips, 3 discs or 6 cassettes, avg. 12:30 minutes, Gr. 6-12. Contents: 1. How We Study It 2. Water & Its Works 3. Wind, Weathering, and Wasting, 4. Pressure and Change Beneath the Earth's Surface 5. Thermal Activity and Igneous Formations 6. Man and His Geological Environment. A thorough and comprehensive overview of the Earth; photography and diagrams clearly define many complicated concepts.

Department of Commerce and Economic Development
Alaska Division of Business Development
PO Box D
Juneau, AK 99811

- *Alaska Coal: Pioneering in a New Environment* ,1983. This VHS cassette tells the history of Alaska coal and its impact on other mining operations and transportation facilities. The Usibelli Coal Mine reclama tion process is featured. Other potential deposits and future coal export trade are also discussed.
- *Hardrock Mining in Alaska: The Searchers* VHS cassette. Discusses Alaska's major mineral deposits, history, mineral uses, geography, and the thoughts of various individuals involved in project development.

National Geographic Society Educational Services
PO Box 1640
Washington, DC 20013-9861
(800)638-6400

- *Geology: Our Dynamic Earth*
  4 sound filmstrips, running time 15-16 min.
- *Portrait of A Coal Miner*
  A 15 minute color 16mm film. 1980 Winner: Cine Golden Eagle
- *Rocks and Minerals*
  Sound filmstrip, 17 minutes, 1983. Grade: intermediate. Discusses igneous, sedimentary, and metamorphic rock, shows some types, and describes their formation and characteristics. Examines minerals as the substances making up rocks; shows types of minerals and some methods of identifying them.

University Films/McGraw-Hill Films
8171 Redwood Highway
Novato, CA 94947

- *Earth and Universe Series, Set 1*
  19-20 minutes; Teacher's Guide, Gr. 4-9. 1972. 3 color sound filmstrips, 3 cassettes, Contents:
  1. How the Earth's Surface is Worn Down,
  2. How the Earth's Surface is Built Up,
  3. The Air Around Us.

  A comprehensive study with concepts simply presented.
  The effects on erosion, weather, wind, plant growth, and human activity are discussed.
- *Earth and Universe Series, Set 2*, 1976.
  3 color sound filmstrips, 2 cassettes, avg. 14:45-18:22 minutes.